

**DRAFT REPORT  
BIODIVERSITY STRATEGY & ACTION  
PLAN FOR JHARKHAND**



**MANDAR NATURE CLUB  
ANAND CHIKITSALAYA ROAD,  
BHAGALPUR, Bihar - 812002**

**Prepared & Edited by:**

**Arvind Mishra**  
Programme Coordinator

**Mandar Nature Club**  
**Phone: 0641-2423479, Fax- 2300055 (PP)**  
**E-mail: mncarvind@hotmail.com & mncarvind@rediffmail.com**

**Coordinating Agency :**

**Mandar Nature Club (MNC)**  
(Regd. Society No. 339/1992-93)  
Anand Chikitsalaya Road  
Bhagalpur, Bihar - 812002, India.  
Phone: 0641-2423479/ 2429663/2300754

**Technical Advisors:**

1. Dr. Tapan Kr. Ghosh, President, MNC & Reader, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur.
2. Dr. Sunil Agrawal, Secretary, MNC, and a prominent Social worker.
3. Dr. Amita Moitra, Vice President, MNC & Reader, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur.
4. Dr. Tapan Kr. Pan, University Deptt. of Botany, T.M.Bhagalpur University, Bhagalpur.
5. Dr. Gopal Ranjan Dutta, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur.
6. Dr. D.N.Choudhary, P. N. College, Dept. of Zoology, Parsa, Saran, Bihar

**Compiled by:**

Dr. Manish Kumar Mishra, Ph.D. (Geography), T.M.Bhagalpur University, Bhagalpur.

# **CONTENTS**

	<b><u>PAGES</u></b>
<i>INTRODUCTION</i>	5
1. <b>METHODOLOGY</b>	5
2. <b>HISTORY</b>	5 - 6
3. <b>GEOGRAPHY</b>	7 -8
4. <b>PROFILES</b>	8- 20
5. <b>ART &amp; CULTURE</b>	20-22
6. <b>TOURISM IN JHARKHAND</b>	22-25
7. <b>TRADITION, RELIGION &amp; BIODIVERSITY</b>	25-26
8. <b>AGRICULTURE</b>	26-34
9. <b>CENTRAL SPONSORED SCHEMES FOR RURAL DEVELOPMENT</b>	34-36
10. <b>FLORA</b>	36-41
11. <b>FAUNAL BIODIVERSITY</b>	42-45
12. <b>FOREST &amp; WILDLIFE</b>	45-54
13. <b>PROBLEMS</b>	55-64
14. <b>ISSUES</b>	64-71
15. <b>EFFORTS</b>	71-80
16. <b>GAPS</b>	80-82
17. <b>SUGGESTIONS</b>	82-89
18. <b>KEY REFERENCES</b>	90-91
19. <b>ANNEXURE (Avifauna of Jharkhand)</b>	

## **ACKNOWLEDGEMENT**

We express our gratitude to the Kalpvriksha, Biotech Consortium and Ministry of Environment & Forests, Govt. of India who assigned the task and helped us in preparing the action plan for Bihar and Jharkhand.

We are thankful to the team of Mandar Nature Club, Bhagalpur that had been extremely concerned to do their best.

We gratefully acknowledge the contribution of Prof. Anil Kumar, ex. Head, University Deptt. of Geography, T.M.Bhagalpur University, Bhagalpur, Dr. D.S.Srivastava, Nature Conservation Society, Daltonganj, Prof. A.K.Pandey, University deptt. of Botany, T.M.Bhagalpur University, Bhagalpur, Prof. S.P.Roy, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur, Prof. R.N.Singh, Retd. Prof. Agriculture College, Sabour, Dr. T.K.Ghosh, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur, Dr. Vidya Nath Jha, Department of Botany, C.M.Science College, Darbhanga, Dr. T.K.Pan, University Deptt. of Botany, T.M.Bhagalpur University, Bhagalpur, Dr. G.R.Datta, University Deptt. of Zoology, T.M.Bhagalpur University, Bhagalpur, Dr. Pitambar Pathak, Marwari College, Bhagalpur, Dr. Sunil Agrawal, Gandhi Peace center, Bhagalpur, Sri Vikas Chandra, IFS, DFO (Wildlife), Hazaribgh, Sri H.S.Gupta, DFO, Saranda, Jharkhand, Dr. Shambhu Nath Khetan, Chairman, District Board, Bhagalpur and others. Many information have been added by Arvind Mishra, State Coordinator, Bihar & Jharkhand, IBCN (a network of BNHS).

The effort by Dr. Manish Kumar Mishra, Ph.D. (Geography) in assisting the whole process is being duly recognized.

We are thankful to Mr. Bipin Kumar Mishra, Cob Web, Computer Center, Bhagalpur for his technical assistance.

## **INTRODUCTION:**

The National Biodiversity Strategy and Action Programme (NBSAP), one of the biggest environmental exercises in the country was initiated in the year 2000. The responsibility initially was given to the state forest department of Bihar to prepare the action plan probably for the states of Bihar and Jharkhand. But nothing had been initiated by the time Jharkhand was separated from Bihar and then nobody was assigned to prepare the action plan for Jharkhand. Ultimately Mandar Nature Club (MNC) agreed to do something in this regard within a very short period with limited resources.

Practically this draft report of NBSAP for Bihar has been prepared within a period of one month. It would have been prepared in much improvised form if enough time had been available in hand.

## **1. METHODOLOGY:**

The team of Mandar Nature Club, Bhagalpur collectively put their efforts in inviting inputs from far and wide in the state to prepare this action plan. The team met regularly and the members went all out to contact the contributors on telecommunication and by visiting them in different towns personally. Many technical, institutional and village persons, grass root workers, NGOs, media persons, Govt. officials including forest department, the public representatives were discussed and interviewed. The scientific papers (published and unpublished) and popular articles reviewed available in hand and received through various direct and indirect sources.

## **2. HISTORY:**

"Jharkhand", the land of tribals and forests is spread over most of the mountainous and forest region. It covers most of Chottanagpur region. Ranchi, the capital of Jharkhand was known as the summer capital of erstwhile Bihar. Buddhists had not much spread in this part of the land but Jainis have their pilgrimage especially in Parasnath region that have a strong belief in the philosophy, traditionally and religiously in **conservation of the environment and biodiversity.**

Christianity has influenced the tribal people in the state and many of the tribal people adopted Christianity leaving their original culture and life style.

Anthropologists would make us believe that Chotanagpur region of Jharkhand must have witnessed the transformation of Homo Erectus to Homo Sapiens. Their claim is based on the findings of hand axes and blades that are strewn here in the region of Pathalgarwa. The discovery of Harappan pottery in Hazaribagh further strengthens the claim to antiquity. The Constitutional Order of 1950 has classified 30 different tribes of Jharkhand, spread over the Chotanagpur plateau that encompasses several districts. These tribes not only differ considerably from non-tribal population but even from one another. Santhals are the most predominant and prosperous among the tribes of Jharkhand. A number of Dravidian tribes like Gonds, Khonds and Koras are believed to have migrated

from the neighbouring states. Mundas are the most ancient among the tribes of Jharkhand, who love to live in association with other tribes. The best known icon of this tribe is Birsa Munda, who was behind the Ulgulan movement of 1900, which gave expression to the tribal anguish and resentment against the English rule and fuelled the agrarian crisis. The oldest geological formation of India are found in Chotanagpur plateau that also stores a vast deposit of a variety of minerals and caters to national and international needs.

Jharkhand since when Bengal, Orissa, Bihar and Jharkhand were all united, the lesson of "**ahimsa**" or non-violence spread throughout this part of the land throughout the world by Emperor Ashoka. The first ever known effort in the history of conservation of biodiversity, and the concept of "**Sanctuaries**" for protecting wild fauna and flora was given by him by establishing the rules to protect them. The fifth pillar edict of Ashoka by which game and fisheries laws were introduced into northern India in the 3<sup>rd</sup> century B.C. He had carved on the enduring stone a list of birds, beasts, fishes and possibly even insects which were to be strictly preserved. The mammals named are Bats, Monkeys, Rhinoceros, Porcupines, Tree squirrels, Barasingha stags, Brahminy bulls and all four footed animals which were not utilized or eaten. The edict further ordains 'that forests must not be burned, either for mischief or to destroy living creatures. Later on the Mughal emperors also had shown deep interest to protect wild animals and their habitat.

The pillars of Ashoka were crowned with the statue of one or more **lions denoting the strength**, sitting on top of a pedestal, which was inscribed with symbols of wheels. This figure of lions, atop a pedestal, with inscription of a wheel, was adopted as the Official Seal of the independent Republic of India (1947).

Sher Shah, a warrior and a noble administrator had made several acts of **land reform**.

During India independence movement, Jharkhand has played vital role. The tribals of this region contributed several sacrifices during the country freedom struggle. Birsa Munda, Siddhu Kanu, Albert Ekka and Tilka Manjhi are the few names among them. The people living in this region have been preserved with their unique socio-cultural identity. The creation of a separate state of Jharkhand is the fulfillment of a long cherished dream of the indigenous people for their separate geo-political identity in the country. The newly born state on 15, November 2000, has many dreams, hopes and aspirations. This state has almost every thing that brings happiness and prosperity to the people i.e. availability of unlimited mines and minerals, abundant forest resources, several attractive tourist spots, a number of prestigious educational institutions, etc. The state also boasts of a great chain of industries including some that are ran by multinational corporations.

River Ganga in a small part of about 100 km. flows through Jharkhand seems to be a unique gift of God providing entirely a different habitat in the state of hills and forests. Thus the state represents the biodiversity of both plateau region and Gangetic plains.

### **3. GEOGRAPHY:**

Jharkhand was first a part of the Bengal Presidency as a part of united Bihar. In 1911, Bihar, was separated from the Bengal. In 1936, Bihar and Orissa became separate

provinces. A new state, Jharkhand was carved out of Bihar with effect from 15 Nov. 2000.

Jharkhand is bounded by Bihar on the north, West Bengal on the east, Madhya Pradesh on the west and Orissa on the south. Jharkhand accounts for 45% of former Bihar's geographical area. About 28% of the population of this area is tribals.

The state comprises entire area of the Chhotanagpur plateau. Physiographically entire region is made up of several plateaus, dissected hilly country interspersed with valleys. The highest parts of the plateau are located in the western part of the state, commonly known as 'pats'. The average height of this western plateau is 900m. above sea level. East of 'pat' regions lies the vast plateau averaging 600m. in height and descending in outlying eastern and southern areas with ridges and deep cuts valleys at plateau edges. The central plateau is again encircled by a lesser plateau with an average elevation of 300 m., which gradually merges to Rajmahal highlands in east and north-east. The plateau area gradually descending to the plains of outlying states of Bihar in north and West Bengal in east.

The western higher parts of the plateau consists of numerous flat-topped plateaus, notable among them are Neterhat, Bagru and Jamia pat. Due to its westward location and height, the entire region is slightly more humid. Plateau margins are steeper, dissected by streams. Though the plateau surface presents a park like appearance. Its dissected valleys and plateau margins supports dense forests.

East of this 'pat' an extensive Ranchi plateau extends east up to West Bengal border and again towards south up to Orissa border. The general topography is undulating with occasional hills and forests. Most of the surface are under cultivation and rest are often bare and rocky. It is more undulating towards south and interrupted with smaller 'Ghats' supporting considerable extent of mixed Sal forest. Towards north, Ranchi plateau is separated from Hazaribagh plateau by the east west extent of Damodar valley. Hazaribagh plateau is much dissected towards west and more densely forests are located in this part. Its forest country gradually merges with dense forest areas of Palamu district in east and south east. Famous Betla and Baresand (earlier famous as Game sanctuary) are located in the western part of the Chhotanagpur.

The lower Hazaribagh plateau gradually extends towards Dumka plain whereas in the north-eastern part of the Chhotanagpur there exist a continuous range of hilly terrain known as Rajmahal hills. The hills are forested in certain portions and mixed in nature. Sabai grass cultivation is encouraged over exposed slopes of these hills. The dry deciduous Sal forest and shrubs dominates the forest with Asan (*terminalia tomentosa*), Mahua (*Bassia Lotifolia*), Palas, etc.

The northern edge is highly dissected by rivers and streams draining towards Ganga Plain of Bihar. Considerable forested tracts demarcate the extent of the Jharkhand state in north.

South of the Ranchi Plateau surface gradually descends to lower level occasionally interrupted by small Ghats and forests. In eastern parts, plateau meets the Dalma range and Kolhan hills. The area is densely forested with dense Sal forest. Famous Saranda forest is located in this part of Jharkhand.

## **The characteristics of Chhotanagpur Plateau**

The Chotanagpur plateau is ranging from 300 meters to 900 meters above sea level. This plateau forms a part of the great Gneissic-Schistose plateau of Peninsular India. Inter-bedded lavas as well as dykes of igneous rock also occur and the western Chhotanagpur plateau is characterized by a succession of flat-topped hills (Partly structural in origin and partly flat due to the erosional activity of varying degree). The scenery of the eastern part of the plateau has been transformed both by development of coal mining and other industries and by the creation of series of lake-reservoirs forming part of the Damodar valley scheme.

Chotanagpur is one long undulating sweep of hills throughout. Its center is a vast plateau, averaging 600 meters in height and descending in its outlying districts to the plains below, with ridges running out beyond its borders into West Bengal. There are hills everywhere grouped into range after range abruptly 300 meters or more out of surrounding level, thrown up like watchtowers over the land. All are covered more or less with thick tree jungles, while lower and more undulating slopes grow vast tree forests that stretch over the land for miles around.

One of its chief attractions is, its large varieties of biodiversity. A hill tract of jungle presents a striking contrast to a well-tended stretch of cultivation, where the rich red soils bears evidence of the tender care of many generations.

### **The Gangetic Plain of Jharkhand:**

The riverine bed of about 100 km. in the district of Sahebganj is a unique gift to the state with plentiful water resources and aquatic biodiversity which is entirely different of the typical character of the state. This area consist of the only Bird sanctuary of the Jharkhand state i.e. Udhuwa lake Bird sanctuary and many true wetlands like Chand Shahar Lake harbouring rich avian fauna and other aquatic biodiversity.

### **Soil:**

The soil of the plateau region is rich in acidic content and alluvial and laterite in composition thus does not hold water. There are 55 varieties of soil in Chhotanagpur and in the Gangetic Alluvium in Sahebganj district, it is - Older alluvium (Bhangar soil) and New alluvium (khaddar soil).

## **WATER SCENARIO IN JHARKHAND:**

### **RAINWATER HARVESTING POTENTIAL**

100 mm of rain captured on 1 hectare of land gives one million liters of water.

- Annual average rainfall in Jharkhand is 1400 mm.
- 16 river basins are there in the state.

- Total replenishable groundwater resources in 1998 was 0.660 million hectares meters per year
- Provision for domestic, industrial and other uses - 0.099 mhm/year
- Available groundwater resource for irrigation - 0.561mhm/year (net)
- Groundwater extraction - 0.121 mhm/year (net draft)
- Balance Ground Water Resources for Future Use in net terms - 0.439 mhm/year
- **Fresh water sources:**
- Ponds and tanks – 29,335 (30300.07 hectares)
- Reservoirs – 106 (107351 ha)
- Low lying areas – 1038 ha
- Traditional water harvesting systems - Ahar

### **MINERALS:**

Jharkhand is a richest state in minerals. 40 percent of the total minerals of the country are available in the state. The state is the sole producer of cooking coal, uranium and pyrite. Jharkhand ranks first in the production of coal, mica, kyanite and copper in India. Important minerals which are essential for the growth of the industries are found here. The geological exploration and exploitation of gold, silver, base metals, precious stones etc. are the potential areas of future.

Jharkhand is rich in other minerals like Iron ore, Bauxite, Fire clay, Graphite, Sillimanite, Limestone & other minerals. The total value of mineral production is amounted to over Rs. 3000 crores.

Sl.No.	Mineral	No. of Mines	Production	Unit	Rank in the Country
1.	Coal	183	59919	Thousand Tonnes	3
2.	Iron ore	28	8659	Thousand Tonnes	1
3.	Boxite	6	1029	Thousand Tonnes	3
4.	Lime Stone	33	1242	Thousand Tonnes	
5.	Copper Ores	5	1189	Thousand Tonnes	1
6.	Manganese	-	18718	Tonnes	-
7.	Mica	84	1082	Tonnes	1
8.	Kainite	3	4922	Tonnes	1
9.	China Clay	25	23256	Tonnes	-
10.	Fire Clay	-	49970	Tonnes	-
11.	Graphite	-	7276	Tonnes	8
12.	Silver	-	13648	K.G.	-
13.	Gold	-	254	K.G.	6
14.	Uranium	-	-	-	1
15.	Chromite	-	-	-	2
16.	Asbestos	-	-	-	1
17.	Thorium	-	-	-	3
18.	Isemenite	-	-	-	2

### **The mineral reserves- Quantum, location and uses**

Minerals	Quantum ('000t)	Location	Uses
Apatite	3070	Singhbhum	Mineral Fertilizers, Gemstone
Asbestos	40	Roroburee, Singbhum	Pipes, Sheets, Gloves, Ropes.
Barytes	15	Singbhum	Hydrated Alumina
Bauxite	68135	Palamu, Ranchi, Gumla, Lohardaga	Alum, Aluminum, Refractory, Emery
China Clay	45930	Lohardaga, Ranchi, Dhumka, Singbhum, Sahibganj	Crockery, Glass
Chromites	334	Singbhum,	Chrome Magnesite Refractory
Coal	6208485	Jharia, Bokaro, Karanpura, Hutur, Auranga, Daltonganj, Deoghar, Rajmahal Coal Fields	
Cobalt (mt)	3.00	Singbhum	Extraction of Cobalt Oxide
Copper Ore	108690	Singbhum, Giridih	Copper Metal
Dolomite	29864	Palamu, Garhwa	Cement, Magnesia, Stone
Flespar	5152	Dhumka, Hazaribagh, Deoghar	Crockery Refractories, Tiles
Fireclay	50462	Dhanbad, Hazaribagh, Palamu, Bokaro, Giridih,	Fire Bricks, Stone Ware, Crockeries.
Garnet	72	Hazaribagh	Beads, as Gem Stone, Gold
Granite	19105	Dhumka, Godda, Deoghar, Ranchi, Daltonganj	Granite Titles
Graphite	389678	Palamu	Pencil, Crucibles, Powder
Iron Ore	308326	Singbhum, Palamu,	Iron Metal
Kyanite	90	Singbhum,	High Alumina Refractories
limestone	964917	Hazaribagh, Santhal Pargana, Palamu, Singbhum, Ranchi	Cement, Fertilizer
Manganese	2363	Singbhum,	Manganese Metal
Mica	13554	Koderma, Giridh, Hazaribagh	Insulation Bricks, Mica Powder,
Nickel Ore	9.00	Singbhum,	Nickel
Quartz	136429	Singbhum, Dhumka, Hazaribagh, Deoghar, Palamu,	Glass Crockery Ware, Acid Resistance Bricks and Tiles.
Quartzite	219842	Singbhum,	Gem Stone,
Talc/Stealite Soap Stone	289	Singbhum, Giridih,	Telecom Powder, Insuletor
Vermiculete	15024	Singbhum,	Insulation Bricks, Insulation

Mineral resources position of Jharkhand with regard to all India is as given below:

SI No.	Mineral	Jharkhand	% share to all India
1	Coal	62,084.85	32.09

2	Iron Ore	3,038.26	31.84
3	Lime Stone	572.25	1.05
4.	Copper Ore	93.06	25.94
5	Bauxite	111.04	3.65
6	Pyrite	52	90.98
7	Chinaclay	41.78	4.8
8	Kyanite	113	8.33
9	Fireclay	47.88	6.81
10	Dolomite	47.2	0.81
11	Graphite	3.5	57.47
12	Bentonite	1.15	0.31
13	Soapstone (Seatile)	0.18	0.31
14	Quartz & Silica sand	148.27	19.02

### **WATER OF THERMAL SPRING AS NATURAL RESOURCE:**

Thermal springs are high temperature aquatic ecosystems. These water bodies are of special interest for ecological study.

Thermal springs are distributed throughout the world their frequency is high in volcanic belts. About 3 thermal springs have been reported from Jharkhand state viz. Surajkund, Tantloi and Dalahi.

Surajkund is located in Hazaribagh. Dalahi and Tantloi are in Santhal Pargana District. Surajkund is disturbed because of intense human activities and extensive use for bathing and washing.

It is also a common sight to find a large number of people suffering from with rheumatism, gout, eczema and other skin diseases sitting and dipping for hours in the warm waters of thermal springs. The lepers feel that the “divined” water can give life to the degenerating tissues. Thus this water possesses therapeutic properties too. Therefore, a thought has been developed that thermal water may be used for Pisciculture and irrigation. A small-scale industry may set up for bottling and sale of mineral water. A therapeutic center may also be set up. (R. N. Yadav, PG Dept. of Botany, T M Bhagalpur Univ.)

### **4. JHARKHAND PROFILE:**

Date of Formation	15th November, 2000
Area	79,714 sq. kms.
Population	2,69,09,428 (As per 2001 census)
Male	1,38,61,277
Female	1,30,48,151
Capital	Ranchi
Indian State	28th
Literacy	54.13 percent
Per capita Income	Rs. 4161

Location	21°58' North to 25°18' North and 83°22' East to 87°57' East
Boundaries	Bihar in North, Orissa in South, West Bengal in East, U.P. & Chattisgarh in West
Total Districts	22
Name of Districts	Bokaro, Chatra, Deoghar, Dhanbad, Dumka, East Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribagh, Jamtara, Koderma, Latehar, Lohardagga, Pakur, Palamu, Ranchi, Sahebganj, Seraikela Kharsawan, Simdega, West Singhbhum.
Language	Hindi, Santhali, Mundari, Hoo, Bangla, Urdu
Minerals	Iron ore, Coal, Mica, Limestone, Graphite Dolomite, Asbestos, Uranium & other minerals
Agriculture Products	Maize, Bajra, Oil Seeds, Fruits, Vegetables, Tea
National Highway	1174 km
State Highway	5978 km
Rivers	Swaran, Rekha, Damodar, Koel, Shank, Barakar etc.
Number of Cites	152
Villages	32,616
Universities	4
Higher Secondary Schools	1003
Secondary Schools	4055
Primary Schools	16,322
Climate	Average yearly rainfall 1400 mm
Assembly seats	82
Lok Sabha seats	14
Rajya Sabha seats	06
State First Governor	Mr. Prabhat Kumar
State First CM	Mr. Babulal Marandi

**Districts: There are 22 Districts in Jharkhand.**

Bokaro	Giridih	Lohardaga	Sahibganj
Chatra	Ranchi	Latehar	Godda
Dhanbad	Gumla	Paschimi Singhbhum	Pakur
Garhwa	Simdega	Purbi Singhbhum	Dumka
Palamu	Hazaribagh	Jamtara	
Kodarma	Saraikela	Deoghar	

**POPULATION AND GROWTH RATE :**

According to the census 2001 data related with various characteristics of population are presented below.

Area	79,261 sq km
Population	2,69,09,428
Males	1,38,61,277
Females	1,30,48,151
Growth Rate (%), 1991-2001	23.19

Density (person per sq km.)	338
Urban Population	22.25%
Sex ratio (females per thousand males)	941
Literacy (%)	54.13
Males	67.94
Females	39.38

### PROVISIONAL POPULATION TOTALS 2001:

Population distribution, percentage decadal growth, sex ratio and population density

India/States/ Union territories*	Population 2001			Percentage		Sex ratio		Population	
	Persons	Males	Females	Decadal Growth		(Females per 1000 males)		Density (per sq. km.)	
1981- 1991				1991- 2001	1991	2001	1991	2001	
India	1027015247	531277078	495738169	23.86	21.34	927	933	267	324
Bihar	82878796	43153964	39724832	23.38	28.43	907	921	685	880
Jharkhand	26909428	13861277	13048151	24.03	23.19	922	941	274	338

### Road Network:

The State is well connected by roads. Road length: 4311 kms. including 1600 kms. NH and 2711 kms. SH.

The State Government is planning to improve and upgrade the existing road network and providing new road linkages/bypass with bridges over river to facilitate quick and efficient movement of raw materials and finished goods.

### Airways:

There are three main airports in the state - Ranchi, Jamshedpur and Hazaribagh. Ranchi is well connected with Delhi, Patna and Mumbai. The state Government process - to upgrade Ranchi Airport as International Airport, to start air taxi / cargo services in major towns of the state and to set up air cargo complex at Ranchi to boost the export.

### Economy and Biodiversity:

Jharkhand's economy is sustained by mining and heavy industry. Agriculture is poorly developed in this state. Irrigation is negligible. Drought therefore, is a periodic threat. It is India's second most important source of coal mining i.e. 26% of the total. Human life is basically dependant upon rainfed agriculture. Poor and landless people are solely dependant upon the forest. They have no option except some employment in mining activities.

The forests of Jharkhand yields valuable commercial products besides the timber. Leaves of 'Kendu' trees are used in the manufacture of an indigenous product for smoking, i.e., the *bidi*. A resinous material secreted by the lac insect is valuable commercially. It is the source of shellac. Also, bangles made of lac are very popular among women of Bihar. Women play a great role in the economy by working in the forest and other commercial activities with the other male members.

### **Mining & Industry:**

The nascent State of Jharkhand has the enormous potential for exploitation of coal, mica and other minerals particualary in Singhbhum, Bokaro, Hazaribagh, Ranchi, Koderma and Dhandbad. It is evident from the existing status of industrial units operating in the district that many ancillary industrial units could be established in and around Bokaro, Jamsedpur, Hazaribagh, Ranchi and Dhandbad using the raw materials in the form of by-products of the industries located in these districts.

### **Big and Heavy industries and companies:**

Some big and heavy industries and companies are given below:

1. Heavy Engineering Corporation (HEC), Ranchi
2. Bokaro Steel Plant, Bokaro
3. Central Coal Fields Limited (CCL), Ranchi
4. Central Mine Planning & Design Institute (CMPDI), Ranchi
5. Indian Institute of Coal Management (IICM), Ranchi
6. Metallurgical and Engineering Consultants (India) Limited, Ranchi
7. Research and Developmerit Centre for Iron and Steel (R&D SAIL), Ranchi

The state's rich forest cover with natural resources, adequate power generation, availability of surface and ground water, availability of land with immense biodiversity, availability of skilled and unskilled labour at economical cost, good rail and road communication and good Telecommunication network makes a most favourable industrial climate in Jharkhand. The state Government is also determined to bring about rapid industrial growth in the state.

### **ENERGY SCENARIO:**

Jharkhand is a resource rich state with abundance of waterfalls, rivers, and huge coal beds. There is an immense scope for mini, micro hydro power stations and non-conventional energy. The State Government objective is to provide electricity to all villages. In this process Rs. 30 crores was invested in the current year 2001 - 2002.

<b>Installed Power Station</b>	<b>Capacity</b>
Tenughat Thermal Power Station	420 MW
Patratu Thermal Power Station	840 MW
Sikkidiri Hydel Power	130 MW
DVC ( Thermal / Hydel )	1200 MW
<b>Total installed capacity</b>	<b>2590 MW</b>

<b>Power Potential in Jharkhand</b>		
Patratu	Thermal	420 MW
Tenughat Phase I	Thermal	630 MW
Tenughat Phase II	Thermal	500 MW
Chandil	Thermal	1200 MW
North Karanpura	Thermal	2000 MW
Shankh II	Hydel	186 MW
Tilalya Dhadhar	Hydel	50 MW
Kanhar	Hydel	450 MW
Maithan	Thermal	1000 MW
<b>Total</b>		<b>5736 MW</b>

An independent Electricity Regulatory Commission was set up to ensure rationalization of power tariff, timely disposal of electricity related disputes and interaction between consumers and board.

In the area of non-conventional energy, an industry status is given to the utilization of non - conventional energy sources. 67 Hydel power generation sites were identified in this area. State Government invites private sector participation to set up mini and micro Hydel power plants and to exploit and develop non-conventional sources of power.

## People: Tribals and Non Tribals

There are 30 tribes and sub tribes in the Jharkhand region. The major tribes being Santhals, Oraons, Mundas, Kharias, Hos, Cheros, Kherwars, Korwas, Bihores etc. Major dialects in the State are Santhali, Kurukh, Mundari, Kharia, Ho, Sadri, Chotanagpuri etc.

The non-tribal group belong to various castes, prominent among which are: kayasthas, bhumihars, rajputs, brahmins and the so-called backward castes - yadavs, koeris, musahars, chamars, and others.

### Jharkhand Main Tribes

<b>SR.NO.</b>	<b>MAIN TRIBES</b>	<b>SR.NO.</b>	<b>MINORITY 'ADIM' TRIBES</b>
01.	Baiga	01.	Asur
02.	Bhatudih	02.	Birhor
03.	Bedia	03.	Virajiya
04.	Bhumiz	04.	Pahariya
05.	Binjhiya	05.	Mal Pahariya
06.	Chero	06.	Sauriya Pahariya
07.	Chick Badaik	07.	Hil Kharia
08.	Gond	08.	Sabar
09.	Gorail	09.	Korwa
10.	Ho		
11.	Karmali		
12.	Khariya		
13.	Kharwar		
14.	Khand		
15.	Kisan		
16.	Kora		
17.	Lohra		
18.	Mahil		
19.	Uraon		
20.	Santhal		
21.	Munda		

### Jharkhand : Tribal population

Area	79,714 Sq.Kilometres
------	----------------------

Population (Toal)	2,69,09,428 (as per census)
Tribal Population	60,00,000 (approx)

## DESCRIPTION OF SOME OF THE TRIBES

### The Santhals

The Santhals are mostly concentrated in the Santhal Pargana, a large upland tract in the Jharkhand state. The forest provides them with everything they need. They have learned to get food and other material from animals and plants, both domestic and wild, including birds, fish, tubers, leaves and fruits. Excellent in reclaiming land, they are also good agriculturists.

The Santhals love music and dance. Their chief festival is the 'Baha', which is a three-day affair of fun and frolic. This festival revolves around the 'Sal', the predominant tree of the Santhal.

**'Sarana and Sasan'** (the places of worship): The Santhal places of worship are called 'Sarna'. The Sarna is actually a sacred grove of Sal trees where their gods live and worshipped.

The Santhal live in clan huts with plastered and painted mud walls. The Santhal men wear dhoti and white turban; women wear 'Parahan' and 'Panchi'. In the Santhal society women enjoys a high status. The Santhal women are fond of ornaments. The women also decorate their hair with sweet smelling 'Mahua' flowers. The Santhals are under the strict discipline of the Panchayats and the social and religious heads.

### The Oraons

The Oraons are Dravidian-speaking, short-stature, narrow headed and broad-nosed people living mostly in the Ranchi and Palamu districts. They are divided like Mundas into several clans or gotras. There are many resemblances between the two communities. The Oraons are much less conservative and exclusive than Mundas. Oraon youths have their hair tied in a knot behind and a small mirror stuck in it and ornaments in their ears. The headman of their village is called the Mahto and the official who presides over their spiritual affairs is the Pahan.

The Oraons employ methods of cultivation, which are much advanced, compared with those of other tribes in Jharkhand. Their most important social institution is the **Dhumkuria or the boy's youth dormitory**, an institution that has put them on the ethnographic map of the world.

## **The Bhumij Kols**

The Bhumij Kols who occupy parts of the two Singhbhum districts west and south of the Kasari River. They are ethnically related to the Mundas and resemble them in physical appearance. Dark brown in complexion, they have thick noses and lips, broad chests, well developed hands and are short in stature. Since they claim to be Hindus and employ Brahman priests they are accepted as such, but their exact position in the Hindu caste hierarchy is not well defined. They do not appear to have fully assimilated the essential elements of Hinduism and completely jettisoned their tribal religion. Many among them still worship their own village deities. Their totemic exogamous clans are fast being forgotten and they have adopted the surname of 'Singh'. Their agricultural technique is not so advanced.

## **The Cheros**

The Cheros who have Dravidian physiognomy and vary in colour, at one time ruled over the Gangetic provinces and claim to be Rajputs. They are **divided into two sections; Barahazar and Tarahazar**. The former rank as the higher and include most descendants to the former ruling families in Palamu. The social status of the Cheros was very high even in the Mughal period and they were given the rank of Mansabdars in Akbar's court. A Brahman priest invested their children with the sacred thread at the time of marriage.

**Agriculture is their original occupation.** Nowadays they keep shop, do carting, work on roads or in coalmines and collect tasar, lac and catechu. They are on the whole, a proud race and have never forgotten that they were once a great people and that their descents are honorable ones. They are also found in the villages of Rohtas and in the Morang region.

## **Kharias**

The vast majority of the Kharias are found in the Ranchi and Singhbhum districts. The hill Kharias practices a crude type of shifting cultivation and hunt with bows and arrows, sticks and with spears. The Birhors are mostly found in the districts of Hazaribagh and usually live in huts made of twigs and leaves but during the rains in semi-permanent settlements. They sustain themselves by gathering wild forest produce, including honey and bee wax, by hunting deer and other animals and by catching birds and monkeys.

## **Pahariyas**

The Sauria Pahariyas live in the inaccessible hilly region and are confined to Godda, Rajmahal and Pakur sub divisions. They do not possess any totemic clans. The Mal Pahariyas, a Hinduized section of Pahariya tribe, employ advanced methods of cultivation, invariably using plough and bullocks to till the small tablelands of the plateau on which they raise quite substantial dry crops

The **Hal Pahariya** tribe, one of the twelve scheduled tribes of the state of Jharkhand. The **Pahariyas** (Mountain dwellers) were the earliest settlers in the district. The **Mal Pahariya** are a **sub-tribe** of this group occupying the hilly parts. Traditionally the group has avoided contact with outsiders and has a reputation for shyness.

The livelihood of the Mal Pahariya is dependent on small-scale cultivation, although they have no access to irrigated land, and droughts severely reduce productivity. Alternative sources of income include woodcutting, and non-timber forest products such as fruit and leaves. However, the gradual depletion of the forest is forcing the groups to live at higher levels on the hills. Migration to nearby towns in search of work is common amongst the men. Health and education are particular problems within this community. Literacy levels are as low as five percent for men one for women. With no access to safe water, water borne diseases are common. Malaria, TB and Kala azar (a tropical fever causing acute anemia) are also common.

## **5.ART & CULTURE:**

The handicrafts heritage of Jharkand is rich in crafts from bamboo and other plant materials specially Baskets and the decorative articles.

### **HANDLOOM SILK**

The skill of the Indian weaver bears testimony to a tradition handed down through generations. In Jharkhand, especially in Santhal Pargana areas are famous for variety of silks including the famous Tassar silk from Bhagaiya are available in an extensive range.

**SHELLAC:** Shellac has a wide range of applications in, both its raw form and processed state. India produces the best quality shellac and Jharkhand is the largest producer of shellac in India. Lac is the resinous secretion of Laccifer Lacca. The lac insect thrives on certain host trees like Palas, Kusum, and Ber.

### **CULTURAL SCENARIO**

Languages	Santhali , Mundari , Kurukh, Khortha, Nagpuria, Sadri, Khariya, Panchparagnia, Ho, Malto, Karmali, Hindi, Urdu, Bangla etc
Festivals	Sarhul, Karma, Sohrai, Badna, Tusu, Id, X-mas, Holi, Dushahra etc
Folk Music	Akhariya Domkach, Dohari Domkach, Janani Jhumar, Mardana Jhumar, Faguwa, Udasi, Pawas, Daidhara, Pahilsanjha, Adhratiya, Vinsariya, Pratkali, Jhumta etc
Folk dance	Paika, Chaw, Jadur, Karma, Nachni, Natua, Agni, Choukara, Santhal, Jamda, Ghatwari, Matha, Sohrai, Lurisayro etc
Folk Singer	Ghasi Ram, Ghasi Mahant, Rungtu, Ledaram, Vasudeo, Shekh Ali aan, Kanchan, Kripal Ram Deogharia, Pandey Durga Nath Rai, Pandey Virendra

	Nath rai, Prafulla Kumar Rai, Chamu Kamar, Bhawapritanand
Musical	Kadri, Gupijantra, Sarangi, Tuila, Vyang, Anandlahri
Instruments	Bansuri, Arbansi, Sahnai, Madanvari, Singa, Sankh Mandar, Dhol, Dhak, Dhamsa, Nagara, Damama, Karha, Tasa, Jurinagra, Visamdhanki, Thapchanchu, Kartal, Jhanjh, Thala, Manjhira, Ghanta
Paintings	Santhali Bhattichitra, Oraon Bhattichitra, Jado Patiya
Rivers	Damodar, Mayurakshi, barakar, Koyal, sankh, Son, Auranga, More, Karo, Bansloi, South Koel, Kharkai, Swarna Rekha, Ganga, Gumani, Batane

### **TRIBAL CULTURE:**

Each of the tribes in Jharkhand comprises a number of clans. Member of a particular clan are said to have descended from a common ancestor and bear the same surname. Hence sexual relations between two persons of the same clan are strictly prohibited. Two or more clans inhabit almost all tribal villages in the state. Seldom does one come across a one-clan village.

### **Marriage**

All the tribals attach a great deal of importance to marriage. Without marriage, nobody is regarded as a full member of the tribe. Manifold are the systems of marriage prevalent among the tribals of **Jharkhand**, notable of them all is **Diku-Andi**, which is arranged by go-betweens. Another important form is **Raji-Khushi**, in which boys and girls take the initiative. Marriage by capture is rare. Sometimes a young woman may intrude into the house of her beloved and refuse to leave it and thus force him to accept her as his bride. This form of marriage be called '**Marriage by intrusion**'. There is a **marriage by service** in which poor youths who have no money to pay bride price serve the beloved's father for a certain period and thus obtain her consent to their marriage. In most of the tribal areas of the state, adult marriage prevails. In some parts of the state, the age of marriage has gone down under the impact of Hindu culture. Monogamy is the general rule, polygamy is not prohibited.

The primary unit of social organization among the tribes is the family which is made up of their unmarried children. Descent is reckoned in the male line, daughters being deprived of the right to patrimony. The women in tribal culture do not possess the right to landed property. They are entitled to the possession of all kinds of moveable property which they can dispose of whenever they like. They also have the right to participate in

the proceedings of tribal councils. Divorce and widow re-marriage are permissible according to the tribal law. They will call for the approval of the panchayats.

## **Food**

The staple food of the Aborigines is boiled rice, which they eat with cooked pulse popularly known as dal. They use pulses of different kinds which they produce in the kitchen-garden attached to their houses. They also grow green vegetables necessarily in their kitchen garden. They all eat goats, sheep, fowls and pigs, but very rarely do they drink milk. The Bats (Badur) and many other wild creatures are their food to be relished. They are immensely fond of liquor and they brew a sort of rice-beer commonly known as 'Handia' which is said to be highly refreshing and invigorating and has great importance in their religious rites.

## **Dress and Ornaments**

Simplicity and plainness are the twin characteristics of the dress of the tribal people. Most of them use a narrow piece of cloth tied round the waist. They keep two sets of dresses one for home and the other for outside wear. They wear dhotis and saris while going out. Tribal, women are excessively fond of ornaments. They have a craze for hansli (a kind of necklace made of silver) brass bracelets and silver earrings. They are famed for keeping their hair tidy by applying mustard or mahua oil and combing it regularly. Tattooing the forehead arms and legs is a common practice with them. This custom is originated from their age-old belief in magic.

## **FESTIVALS:**

In tribal life, there is a succession of festivals throughout the year which are connected with agricultural operations. Most of the important festivals among them are **Sarhul**, **Karma** and **Soharai**. Sarhul is the most popular of all tribal festivals. It is celebrated on the last day of BAISAKH, which corresponds to the month of April according to the Christian calendar. It is observed at a time when Sal trees are laden with flowers. It resembles the **Vasant-mahotsava** of the Hindus and may therefore be described as the spring festival of tribals. It is an occasion of great festivity and enjoyment for people of all ages. All night maidens and youths sing and dance to the accompaniment of the drum, while the old sit and enjoy the enchanting dance. Another festival among the aborigines is **Soharai or Banda parab**, which occurs in the month of Pous, celebrated shortly after the harvest of the rice-crop of the year. It may be called the harvest festival of tribals. On this occasion domestic animals are worshipped after being washed, anointed with oil and smeared with vermilion. The **Karma festival** is one which observed by the tribals as well as the non-tribals. There are sufficient grounds to believe that it is an imitation of the Hindu festival. On this occasion the tribal youths spend the whole night in singing and dancing. The song sung on this occasion narrates the legends of Karma and Dharma. The

Hindu tribals also celebrate the typically Hindu festivals of Holi and Durga puja with great enthusiasm.

Many tribal festivals are linked to plants; **Sal** (Shorea Robusta) with Sarhul, **Karam** (Adina Cordifolia) with Karma, **Semal** (Bombax Malabarica) and **Seedha** (Lagerstroemia Parviflora) with weddings.

The non tribal people of Jharkhand celebrate the common festivals of their respective communities like; Chatt Puja, Ramnavami, Makar-Sankranti, Anant-brat , Navaratri, Dussehra, Holi, Diwali, Nag Panchami, Id, Bakrid, Shab-e-Barat, Christmas etc.

## **6.TOURISM IN JHARKHAND:**

### **Ranchi**

Ranchi, the capital of Jharkhand is situated picturesquely in the heart of the state at an altitude of 2,140 feet above sea level. It is well known for its scenic attractions, waterfalls, barren rocks and hillocks. It has a number of industrial complexes, which are very important in the industrial life of the country.

**Ranchi Hill and Ranchi Lake:** The landmark of Ranchi is a hill bearing a temple of Shiva on its summit with a lake at its foot, known as ‘Ranchi Lake’. One can have panoramic view of the town and the surroundings from the top of the hill.

**Tagore Hill:** On the periphery of Ranchi is “Tagore Hill”, named after Rabindranath Tagore, who is believed to have written a part of his famous Gitanjali here, besides other poems. Ram Krishna Ashram is situated at the foot of the hill.

**Kanke Dam and Jagannath Temple:** On the other end of Ranchi is the ‘Kankedam’, which is ever crowded with tourists. It is a popular picnic spot. Few kilometres from the dam and 10 kilometers from Ranchi is the 17th century “Jagannath Temple” when the annual Rath Yatra is held in the month of June/July. There is another beautiful dam known as “Hatia Dam”. It is about 12 kilometres from the city.

**Hundru Falls:** ‘Hundru Falls’ where the Subarnarekha River cascades down from an altitude of 320 feet is a sight not to be missed specially in monsoon or when the wind sets the motion. The pools at the base of the falls are favourite picnic and bathing spots. Jonha Falls: ‘Jonha Falls’ also known as Gautam Dhara, is another enchanting retreat amidst rich flora and fauna beside the Kanchi River. The scenery around it is very picturesque and it is a popular picnic spot. To admire the fall one is required to descend 500 pared steps.

**Muggar (Crocodile) Breeding Centre:** 23 kilometres from Ranchi is the Mutta Muggar Breeding Center in Ormanjhi, which took off with 3 Jharkhandi muggars (crocodiles) and 2 from Chennai. Today they account for over fifty. Nearby is the biological park replete with valuable samples of wildlife.

**Netarhat:** 156 kilometers from Ranchi is ‘Netarhat’, the queen of Jharkhand. It is situated at a height of 3,700 ft above sea level and is a hill station of Jharkhand. Netarhat

is a beautiful resort during summer. Dense forests, serpentine roads, cool bracing breeze, moonlit nights must have persuaded the English to call this place, which possibly sums up 'nature' and heart of Netarhat. The sunrise and sunset views are very few fascinating here. The tourist bungalows here are an ideal place for viewing sunrise, which is equally picturesque. 10 kilometers off is 'Magnolia Point' famous for its stunning sunset view.

**Upper Ghagri Water Falls:** A popular picnic spot is just 6 kilometers.

**Lower Ghagri Water Falls:** 10 kilometers from Ranchi is famous for its beautiful scenery and is a popular picnic spot.

**Lodh Falls:** 61 kilometers from Netarhat. It is one of the biggest water falls of Jharkhand where water falls from a height of 468 feet.

**Sadni Falls:** 35 kilometers from Ranchi, it is a snake type waterfall and is a popular picnic spot.

**Betla national park:** In the district of Daltonganj is a rich national park with tigers, panthers, elephants etc. Endowed with thick tropical forests and a rich variety of fauna, the core area of the sanctuary has been declared as Betla National Park. This park is a great attraction to tourists. At an average elevation of 1,000 feet, it is open throughout the year. Large herds of Gaur and Chital are commonly seen. Elephants are present mostly after the monsoons up to the time when water holes begin to dry up. Tiger, Panther, Sloth Bear, Wild Bear, Sambhar, Nilgai, Kakar, Mouse Deer are permanent residents of this national park. Large families of langurs are an ever-present attraction. Palamu is now one of the nine Tiger Reserves in India under Project Tiger. It has waterfalls and hot springs too.

**Topchanchi Lake:** The Topchanchi Lake lies 37 kilometers from Dhanbad and is almost on NH2. It is an artificial lake surrounded by green hills and forests and a wonderful place for picnics and spending quiet holidays.

**Maithon Dam:** It is 52 kilometers from Dhanbad. Maithon is the biggest reservoir of the Damodar Valley Corporation. This dam, designed for flood control, has been built on the Barakar River. It has a unique underground power station, which is the first of its kind in Southeast Asia. Just a little distance from the dam lies the ancient temple of Kalyaneshwari. The lake at Maithon is spread over an acre of 65 square kilometers.

**Panchet Dam:** It is constructed on Damodar River, which is 22,155 feet long and 134 feet high. A hydel power station has also been constructed against the background of Panhet Hill in the eastern side of the dam.

## **Jamshedpur**

Jamshedpur or Tatanagar is well known as the steel city of India. It is a major industrial center of India with picturesque surroundings. The town is also an industrial center with a chain of multiple industries. It is a model town. **Dalma Sanctuary** (193 square kilometers) near Jamshedpur is the best elephant habitat of Jharkhand, where the pachyderms love to spend their summer. Jubilee Park at the heart of the city is a well-

planned garden like Vrindavan Gardens in Mysore. Other places of interest are the factories of Tata Steel, TELCO, Tinsplate and Indian Tube Company. The Dolwa Hill Top at an altitude of 3,060 feet is just 41 kilometers away from the city.

**Hazaribagh:** Meaning ‘a thousand gardens’, is a famous health hill resort situated on a height of 2,019 ft above sea level. It has an excellent climate and beautiful sceneries are all around it in the midst of dense forest. It is rich in flora and fauna. Hazaribagh is 93 kilometers from Ranchi by road and at the same time it is also well connected by road with important towns of the state. Important tourist spot of the city includes the Parasnath Temple situated on the highest hill of the state (4,480 ft). According to the Jain tradition, no less than 23 out of 24 Tirthankaras are believed to have attained salvation in the sammetasikhara of the Parasnath hills. The hill seems to have been an abode of the Jains.

**Canary Hill:** Close to the town lies the Canary Hill, which has a well-laid park and is studded with three small lakes. It has an observation tower. From the top of the hill one can have a panoramic view of the town.

**Tilaiya Dam:** This dam, situated across Barakar River is a preferred attraction for the tourists. It is just 55 kilometers away from Hazaribagh. The main road from Barhi on GT Road passes through the reservoir and the hillock offers a breathtaking sight.

**Urwan Tourist Complex:** Few kilometers from the Tilaiya Dam is the State Tourism Development Corporation’s Tourist Complex at ‘Urwan’, where one can consider spending time by the side of the dam, where one can enjoy boating and other water sports. Near the complex is Hari Har Dham at Bagodar, which is famous for the 52 feet high ‘Shiv Ling’, which took 30 years to complete and is believed to be the tallest in the world.

**Rajrappa:** 90 kilometer from Hazaribagh town is Rajrappa, famous for “Maa Chhina Mastika” temple where river Bhera joins the Damodar from a height of 20 feet. Konardam-There is another Dam-Konar Dam, which is just 51 kilometers from Hazaribagh.

## **7. TRADITION, RELIGION AND BIODIVERSITY:**

### **SACRED GROVES**

**Mundas, Oraons and Santhals** are tribals groups spread over many forested districts of Jharkhand. Here the tribals still display many traditional conservation practices. These include protection of sacred groves from which no plant material is removed. These sacred groves are called Saranas, and harbour their deities in natural forms such as stones. These Saranas fulfill a verity of functions welcoming entrants to the village, favouring a good harvest of crops, protection against wild animals and epidemics, guarding against evil spirits, etc.

Traditionally, tribals practice an **annual ritual hunt** after worshipping the forest god. In this hunt they spare pregnant females and all immature animals. Men belonging to these communities promote protection of medicinal plants from overharvesting, fire and grazing.

These traditions are now being eroded due to commercial interests who are often helped by the Forest Department.

#### **Gene Pool:**

The tribals are in a habit of keeping dogs as their important pets. They are much useful in their life style. Only the pet dogs of the dominant tribals (Santhal, Birhor and Oraon) in the villages of Hazaribagh have been selected in India by National Geography Channel for international study because this indigenous breed is yet supposed to be preserved in its original form. The Barking Dog Association, New York has been given a contract for the study. This project will compare the above breed from the breeds found in Philippines, U.S.A., Australia and New Guinea. World Conservation Union (IUCN) and a Hazaribagh based NGO, INTACH (Indian National Trust for Art and Cultural Heritage), known to be one of the best environmental working group in Jharkhand have been associated with this project.

#### **Plants in tradition:**

The tribal women are very much fond of using various wild flowers like Mahua and other plant leaves as ornaments. Many of the plant species **as described in the Action Plan of Bihar** are being used in Jharkhand in their day-to-day life in rituals and traditions. The people of Jharkhand use many of the plant species to extract colours from them to decorate their houses with paintings like the Mithila people of Bihar as described in the Action plan of Bihar.. They are very keen to keep their houses clean and decorated.

## **8. AGRICULTURE**

Besides the strong mineral base, the basis of the economy is agriculture and allied activities. The State of Jharkhand has a total geographical area of 79.7 lakh ha. out of which cultivable land is 38 lakh ha. and the present net sown area is 18.04 lakh ha. The net irrigated area is only 1.57 lakh ha. which is 8% of the net sown area. More than 29% land is covered as forest areas and 25% of land is covered as sown areas. In Deoghar District, still floriculture is in practice for better economy of the farmers.

The district of Sahebganj covers the Gangetic plain in area of about 100 km. stretch and the crop pattern is similar to the marginal cultivation and Diara cultivation pattern of Bihar.

The main Agricultural products are Rice, Maize, Bazra, Til Oil Seeds, Vegetable and Fruits.

#### **Rice:**

Rice is the main crop of the state. Most of the area is covered by traditional systems of cultivation, though scientists claim to have developed high yielding varietal technologies, their adoption has been negligible as farmers prefer their own cultivars which are adapted to the varying conditions prevalent in the region. These cultivars have passed through innumerable selection cycles. High yielding varieties perform better where management is better, but virtually fail when conditions are adverse. Practically the farmers are not much convinced to grow higher yield varieties possibly because these varieties need high level of management, there is necessity for sufficient irrigation water; and many input application level, that may not be available to the farmers.

### **Pulses:**

The cultivation of pulses is still confined to marginal or poor land. It is, therefore, the gap between the demand and supply of pulses continues to widen.

The vegetables include- Brinjal, Cabbage, Cauliflower, Ladies Finger, Onion, Green Peas, Tomato, Pumpkin, Green Chilly and others.

A large varieties of rich fruits produced in the state are- Mango, Litchi, Guava, Banana, Papaya, Lemon, Jackfruit and others.

Besides Grains, Vegetable and Fruits, there is also a large scope of producing Jute, Hemp, Sisal and other fabrics to boost the State Economy. There is also a large potential of Tea Cultivation, Floriculture and Horticulture in the state for export.

Plantation and Horticulture sector is one of the important sub sectors of agriculture, having ample scope for expansion in the State of Jharkhand. The total area occupied by various Plantation and Horticulture crop in the State is about 2.57 lakh ha., with an estimated total production of 37.85 lakh tones. The share of these crops is 3.25% of total geographical area of 79.20 lakh ha. and 14.21% of net sown area of 18.02 lakh ha.

### **The area and production and major Plantation & Horticulture crops in the state**

**(1998-99 status) are as under.**

S. No.	Crops	Area (in ha)	Production (in MT)
i.	Mango	7153	85836
ii.	Banana	2580	51600
iii.	Guava	5030	60360
iv.	Litchi	1377	16524
v.	Citrus	5377	53770
vi.	Other fruits	11386	113860
vii.	Vegetables#	223595	3394888
viii.	Coconut	789	7890

Different kinds of fruit crops are grown in Jharkhand. Considering the agro climatic suitability and future prospects, Government of Jharkhand, has programmed to implement various schemes and programmes for the promotion of this sector. Major thrust is being given for bringing additional area under various Plantation and Horticulture crops and enhancing the productivity of existing crops.

#### **Irrigation Status:**

<b>S.No</b>	<b>District</b>	<b>Percentage of Irrigated land of Total Agriculture Land</b>
1.	Godda	14.21
2.	Dumka	9.47
3.	Sahebganj (Pakur)	3.86
4.	Deoghar	14.22
5.	Dhanbad (Bokaro)	2.08
6.	Hazaribagh (Chatra)	10.51
7.	Giridih	6.99
8.	Palamu (Garhwa)	24.25
9.	Ranchi	6.12
10.	Lohardagga	8.87
11.	Gumla	2.45
12.	E.Singhbhum	5.0
13.	W. Singhbhum	4.0

#### **Sources of Irrigation at Jharkhand**

Canal	17.53%
Pond	19.07%
Tube well (Nal Kup)	8.25%
Well	29.38%
Others	25.77%

Increase in population demands for more food grains. Since there is a limitation to production of food grains, the alternate resources can be exploited for fisheries development. This would be a good source of protein food. Fisheries sector has vast potential to provide employment to people in rural areas and thus to improve their socio economic condition. This sector has high export potential also.

<b>Sl. No.</b>	<b>Type of water resources</b>	<b>Number</b>	<b>Area (in ha.)</b>
----------------	--------------------------------	---------------	----------------------

1.	Ponds / tanks	29,335	30300.07
2.	Reservoirs	106	107351.00
3.	Low lying areas		1038.90

### **Livestock:**

Live Stock production of milk, eggs and wool in Jharkhand state indicates that this sector makes a sizable contribution to the state's economy during 2001-2002.

Most of the dairy development activities in the Jharkhand State are taken care of by the Dairy Development Directorate. The districts of East and West Singhbhum, Ranchi, Bokaro, and Dhanbad are directly under the control of COMFED. The Dairy Development Directorate is promoting Milk Producers' Unions in the districts of Ranchi Lohardaga, Palamu, Gumla, Chaibasa, East Singhbhum Hazaribagh and Bokaro and providing help in collection of milk from rural areas through milk cooperative societies and marketing in the urban areas, establishment of mini-dairies, provision of technical inputs extension services etc.

The State has forage feed production farm at Chatra. There is also one feed plant of COMPFED in Ranchi, which manufactures and supplies Adult Cattle Feed (ACF).

The tribals have a tradition to keep the cattle of indigenous varieties near their houses. But the production is mostly self-consumed as for them the direct accessibility to the consumers is very poor.

### **Horticulture:**

Horticulture is one of the important sub-sectors of agriculture, having ample scope for expansion in Jharkhand. Considering the agro-climatic suitability and future prospects, the state govt. has planned various schemes and programmes for promoting horticulture in the state. A major thrust is being given for bringing additional areas under various types of plantation and horticulture crops and enhancing the productivity of the yielding crops.

### **MUSROOM CULTIVATION:**

Only hilly areas were considered suitable for mushroom cultivation, which are relatively financially backward and are located far away from consumption centres in big cities. Ranchi and Hazaribagh have the coldest climate in whole of Jharkhand. These areas constitute an ideal condition for mushroom cultivation.

### **SHELLAC:**

Shellac has a wide range of applications in, both its raw form and processed state. India produces the best quality shellac and Jharkhand is the largest producer of shellac in India.

Lac is the resinous secretion of Laccifer Lacca. The lac insect thrives on certain host trees like Palas, Kusum, and Ber. There are about 3-4 million host trees in the Chottanagpur region.

### **SERICULTURE:**

Jharkhand mostly produces Eri and Tasar varieties of silk. Before the beginning of 1st five years plan these were small organizations run by state govt. of the ten Bihar for the maintenance and development of silk industry i.e. a Tasar seed supply station at Chaibasa (Singhbhoom), a Tasar seed supply sub station at Amrapara (Santhal Pragana) and an Eri seed supply station at Ranchi having five small demonstration centres. Eri is the main silk produced in Ranchi. Nowadays a research centres has been started in Jharkhand as Central Tasar Research Station, Ranchi.

**Kinds of Silkworms:** Different kinds of silkworms of commercial importance belong to the two families namely Bombycidae and Saturniidae of order Lepidoptera of class Insects. About 30 species of insects belong to three families.

<b>Silkworms</b>	<b>Variety of silk filament obtained from cocoon</b>
<b>Bombyx mori</b>	Mulbury (Shiny, creamy and white fibres.)
<b>Antharae assama</b>	
<b>i. Muga silk moth</b>	Muga (a golden colour allied of Tasar)
<b>ii. Tasar silk moth</b>	Tasar (coppery colour)
<b>Philosamia ricini</b> <b>Attacus ricini</b> <b>Eri silkworm</b>	Eri (a creamy white silk, less shiny than Mulbury silk)

**Utility of silk:** The raw silk is utilized in the manufacturing of dresses, parachute, fishing lines, elastic webs and parachute, sieves for flour mills, insulation coil for telephone, wireless receivers and tyres of racing cars. Cocoon is used as medicine by Hakeems. The raw silk is changed to yarn by machines and this yarn is dyed and used for different purposes. It may be mentioned that artificial silk, rayon and other silk substitutes have captured a section of market and the natural silk industry is facing a tough competition with artificial silk.

Eri silk is produced in Ranchi where Central Tasar Research Station is located Different type of silk like Mulbury, Tasar, Munga and Eri have different types of specific food plants and out these four Eri silk is obtained from the worm reared on Castor plants. For this purpose the Seri culturist who wants to produce Eri type of silk they cultivate the

Castor plants in the field and rear the worms on it. The castor plantation, which is not a perennial plant, purifies the environment by eliminating oxygen continuously till its life. Silk is used mainly in the textile industries for manufacturing garments especially in the making women hosiery. Due to the high investment required in the collection and production of silk, use of silk textiles has become rather a status symbol. Silk is also used in the manufacturing of cartridge bags; telephone cable insulation, tyres for racing cars etc.

**Diseases of silk worms:** the artificial propagation of silk worms under insanitary conditions makes the silkworm prone to many forms of diseases. Due to the disease in the silkworms either the infected eggs remain unhatched or if hatched they are in malformed states.

### **Diara Land:**

'Diara' is a typical landmass especially in the Gangetic alluvial land. But a very small part of the state falls under Gangetic alluvium especially in the district of Sahebganj bordering W. Bengal and Bangla Desh. The land contains more soil and is alluvial in nature.

This type of land is affected due to the flood and erosion. The land is more fertile and there is less 'Kharif' crop is there in the region. This type of land consists of the grassland of 'Kashal' or 'Kush' and 'Jhhaua'. The local people go for some wheat and pulses cultivation whatever they can and others few grow vegetables like cucumbers applying local technique by digging the earth.

Rice is less cultivated in the Diara land and if grown by some of the farmers it is not of good quality and so having less commercial value. But the main crop of the area is Maize, Wheat, Barley, Gram, Pea, Arhar, Masur, Moong, Kalai, Khesari, Kurthi, Sugarcane, Methi, Dhania, Mustard and Jute. 'Kashal' or 'Kush' and 'Jhhaua' are the excellent fodder for the cattle when young and at maturity these are used for making rooftop of their houses.

**Fauna of Diara land:** Only natural fishing id there in the Chaur and Dhar and in the river. Rohu and katla are the main species popular among the locals. Whereas Hilsa near the border of Farakka in W. Bengal is of high commercial value. Not many wild animals like Wild boars and Nilgai are found in the region unlike the diara land of Bihar. The other fauna of this region are the snakes (including water snakes) frogs, the Gangetic Dolphin (*Platanista gangetica*), crocodiles, Gavials (*Gavialis gangeticus*), turtles, and hundreds of varieties of migratory and local birds. The cattle are everywhere in good number. The people of Diara use horses for their means of local conveyance.

**People of Diara land:** The people of Diara are mainly belonging to the cast of Gangot, Yadav, Bhumihar, Rajput, Koiri and some of the tribal population of Kharwar. The tribals are mainly the labourers in the area.

**Research Activities:**The Agro Economic Research Center (AERC) for Bihar (& Jharkhand now also) was set up as late as on 30th March 1996 has done a creditable job

within a short span of existence. The Center has just completed five years of inception with full research activities and during this short span; the Center has undertaken various studies of national importance. A year wise profile of research activities of Agro Economic Research Center for Bihar & Jharkhand is given here under:

### Research Activities:

No.	Title of Studies	Assignment Year	Sample District/ State	Status
1.	Economics of Export Oriented Horticulture Crop (Litchi) in Bihar	1996-97	Muzaffarpur	Report submitted in September 1997
2.	Production & Utilization Pattern of Milk at the Rural Producers' level in Bihar	1996-97	Muzaffarpur & Samastipur	Report submitted in April 1998
3.	Economics of Pulses Production & Identification of Constraints in Raising their Production in Bihar	1996-97	Godda & Bhagalpur	Report submitted in May 1998
4.	Prospects of value Addition of Forest Produce in Tribal Areas of Bihar	1997-98	Ranchi & Hazaribagh	Report submitted in May 1998
5.	Prospects of Tea Plantation in Kishanganj District of Bihar	1998-99	Kishanganj	Report submitted in October 1998
6.	Socio-Economic Evaluation of the National Integrated Pest management Programme in Bihar	1998-1999	East Champaran & West Champaran	Report submitted in October 1998
7.	Economic Reforms & Dynamics of Cooperative Movement in Bihar	1998-1999	Patna & Nalnada	Report submitted in October 1999
8.	Production & Utilization Pattern of Milk at the Rural Producers' level : An Analysis Across the States. (A Consolidated Report)	1997-1998	A. P., Bihar, Gujrat, Punjab & West Bengal	Report submitted in January 2000
9.	Prospects of Value Addition of Forest Products in Tribal Areas : An Analysis Across the States. (A Consolidated Report)	1997-1998	M. P. and Bihar	Report submitted in July 2000
10.	Economic Reforms & Dynamics of Cooperative Movement in India (A Consolidated Report)	1998-1999	Assam, Bihar, H. P., Maharashtra & TamilNadu	Report submitted in September 2000
11.	Problems, Potential & Economics of Mushroom Cultivation in Bihar	1999-2000	Ranchi & Hazaribagh	Report submitted in March 2001
12.	Interim Report on Setting up Farm Machinery Institute in Bihar (As a Catalyst for Eastern Region)	2000-2001	Bihar	Report submitted in June 2001
13.	Impact of Minimum Support Prices on Agricultural Economy in Bihar	1999-2000	Rohtas, Purnia & Darbhanga	Draft report submitted in Jan. 2002.

14.	Flow of Credit to small and Marginal Farmers in Bihar	2000-2001	Bhagalpur & Madubani	Draft report submitted in Feb. 2002.
15.	Economics of Pulses Production in Mokama Tal Area of Bihar	2000-2001	Patna & Lakhisarai	Drafting of the report in progress

### **Agriculture Colleges and their work:**

Birsa Agricultural University at Ranchi is functioning at Kanke includes:

1. Ranchi Agricultural College, Kanke
2. Veterinary College, Kanke

All function in the similar government setup. Agricultural practices and problems are similar. Condition of Birsa Agriculture University is better up to some extent in comparison of Bihar.

### **Government set up:**

1. Director of Agriculture, Bihar
2. Joint Director of Agriculture at Commissionary level.
3. District Agriculture Officer
4. Sub divisional Agriculture Officer
5. Block Agriculture Officer
6. V.L.W. – Village level Worker

### **KVK (Krishi Vigyan Kendra)**

K.V.K. are being established in all the districts of Bihar by I.C.A.R. (Central Govt.) in collaboration with agricultural universities.

### **Functions of K.V.K.:**

1. training of farmers regarding improved seeds, improved implementation of new agricultural technologies, plant protection measures.
2. Production of new improved seeds, new crops like medicinal crops, fiber crops, floriculture, flower cultivation, processing and marketing.
3. Training regarding Bee keeping, Goat keeping, Pigery, Poultry, Dairy, handling of Tractor, Agricultural implements etc.
4. Demonstration of new varieties, hybrid varieties, paddy transplanter, harvester, thresher etc.
5. Training regarding fruit preservation (Jam, jelly, squash, achar etc.)

### **Macromode Training Programme:**

It is a central govt. scheme executed through District Agricultural Officers (D.A.O.). fund is provided by I.C.A.R.. Agricultural scientists and specialists of Agriculture colleges & KVK are generally engaged in training programmes. Seeds, Implements and Tractors are also provided on subsidiary rate to the farmers.

## **9. CENTRAL SPONSERED SCHEMES FOR RURAL DEVELOPMENT:**

Many schemes are often launched by the central govt. but it is wide open fact that to get the real benefit of it one has to struggle very hard and accept malpractices of the system. In between, a major share of the benefit is distributed at various points.

### **SWARANJAYANTI GRAM SWAROJGAR YOJNA**

This programme was launched in April, 1999. This is a holistic programme covering all aspects of self employment such as organization of the poor into self help groups, training, credit, technology, infrastructure and marketing.

### **JAWAHAR GRAM SAMRIDHI YOJNA**

The critical importance of rural infrastructure in the development of village economy is well known. The Central as well as the State Governments for building the rural infrastructure have initiated a number of steps. The public works programme has also contributed significantly in this direction.

### **INDIRA AWAS YOJANA**

IAY is the flagship rural housing scheme, which is being implemented by the Government of India with an aim of providing shelter to the poor below poverty line. The Government of India has decided that allocation of funds under IAY (Indira Awas Yojna) will be on the basis of poverty ratio and housing shortage.

### **CREDIT CUM SUBSIDY SCHEME FOR RURAL HOUSING**

There were a large number of households in the rural areas which could not be covered under the IAY, as either they do not fall into the range of eligibility or due to the limits imposed by the available budget. On the other hand due to limited repayment capacity, these rural households cannot take benefit of fully loan-based schemes offered by some of the housing finance institutions. The need of this majority can be met through a scheme which is part credit and part subsidy based.

### **DRDA ADMINISTRATION**

District Rural Development Agency (DRDA) has traditionally been the principal organ at the District level to oversee the implementation of the anti-poverty programmes of the Ministry of Rural Development. Created originally for implementation of Integrated Rural Development Programme(IRDP), the DRDAs were subsequently entrusted with a number of programmes, both of the Central and State Governments. Since inception, the administrative costs of the DRDA (District Rural Development Agency) were met by setting aside a part of the allocations for each programme. Of late, the number of

programmes had increased and several programmes have been restructured with a view to making them more effective. While an indicative staffing structure was provided to the DRDAs, experience showed that there was no uniformity in the staffing structure. It is in this context that a new centrally sponsored scheme-DRDA (District Rural Development Agency) Administration has been introduced from 1st April 1999 based on the recommendations of an inter-ministerial committee known as Shankar Committee. The new scheme replaces the earlier practice of allocating percentage of programme funds to the administrative costs.

#### **DROUGHT PRONE AREAS PROGRAMME**

The Drought Prone Areas Programme(DPAP) aims at mitigating the adverse effects of drought on the production of crops and livestock and productivity of land, water and human resources. It strives to encourage restoration of ecological balance and seeks to improve the economic and social conditions of the poor and the disadvantaged sections of the rural community.

#### **Member of Parliament Local Area development Schemes (MPLADS)**

##### **Community Development**

**Basic Minimum Service etc.**

### **10. FLORA:**

#### **FLORAL DIVERSITY: PRESENT STATUS AND STRATEGY FOR CONSERVATION**

##### **Present status**

The vegetation of the state is mainly tropophilous but with a tendency towards xerophytoc structure in many of its species. Nearly all the trees and shrubs are deciduous in summer except in ravines and along streams. In the moist valleys and ravines on the northern face of the Rajmahal hills, *Musa paradisiaca* (wild banana) with their large leaves present more typically tropical vegetation than is found elsewhere. The forest cover is fairly dense during monsoon months comprised of annual as well as perennial species.

*Shorea robusta* (sal) is the principal tree species. Generally sal has a number of codominants, the chief amongst which are *Terminalia alata*, *Anogeissus latifolia*, *Careya arborea* and *Pterocarpus marsupium* (*murga*). *Shorea robusta* and *Terminalia alata* associated with *Buchanania lanzan* (*chiraunji*), *Bridelia squamosa* and *Mallotus philipensis* (*sinduri*) occur almost throughout the area.

A few pockets exhibit vegetation of xerophilous nature. The southern plateaus are covered with natural vegetation. Besides, a considerable extent of hydrophytic flora and swampy vegetation occur here and there. As per classification of Champion and Seth (1968), the forests are divided into three major groups: (a) moist tropical forests, (b) dry tropical forests and (c) Montane subtropical forests.

## Plants and people

The State is rich in a large number of economically and useful plants. The tribals are largely dependent upon plant like mahua, date palm, toddy palm, (country liquor, fan, mat, roof top), bamboo, *Bauhinia* (mat, basket and craft), bhelwa (fabric marker), palash, *Woodfordia fruticosa*, sinduri (dyes), *Casearia elliptica* (fish poison), nirgundi, *Ocimum* (insecticide) for their domestic use and livelihood. Tribals collect medicinal plants like *Rauwolfia serpentina* (sarpagandha), *Tinospora cordifolia* ( guruchi), *Helicteres isora* ( marorphali), *Abrus precatorius* (Ratti), *Adhatoda zeylanica* (vasaka).

## PLANT FOSSILS: A HIDDEN TREASURE

Fossils are the ancient remains of plants and animals in the different strata of sedimentary rocks of the earth's crust. It may be in the form of imprints, compression impression, petrification, and moulds or in toto. It is derived from the Latin word 'Fodere' means 'to dig'.

The Rajmahal hills have been described as "Classic ground for the study of Indian geology". It is on international map for its rich fossil flora. Several species of Rajmahal have been found in the Jurassic rocks of S. Africa, Australia, New Zealand and Antarctica, which once formed the ancient Gondwana land. The age of the Rajmahal flora has been regarded as corresponding to the Lias (Lower Trias).

The range of Rajmahal hills consists of a succession of the Basaltic lava flows or traps with interstratifications of shale and sand stone. Rajmahal hill is famous for its rich fossil flora which are obtained from the two bands of fine grained and light coloured shale, the lower one 10-15 feet thick and upper one 20-25 feet thick separated by a lava flow.

The plant fossil includes the member of Lycopodiales, Equisetales, Filicales, Pteridospermae, Coniferales, Cycadophyta, and Angiospermae. The great Indian palaeobotanist Prof. Birbal Sahni and his students recorded several rare plant fossils from this area, which are till yet reported from any corner of the world. This brought the Rajmahal hills for its fossils flora on the top of the Paleontology world and several foreign teams, scholars interested in the study of origin of life and Angiosperms and different evolutionary relationship among the other plants groups have been regularly visiting this area every year right from 1822.

## IMPORTANT SEED -BEARING PLANTS OF JHARKHAND

### TREES

SL. NO.	LATIN NAME	LOCAL NAME
1	<i>Acacia arabica</i>	Babul
2	<i>Acacia catechu</i>	Khair
3	<i>Adina cordifolia</i>	Karam
4	<i>Aegle marmelos</i>	Bel
5	<i>Ailanthus excelsa</i>	Ghorkaram
6	<i>Alangium lamarckii</i>	Dhela

7	<i>Albezziia lebbek</i>	Siris
8	<i>Albizzia odoratissima</i>	Jang siris
9	<i>Albizzia procera</i>	Safed siris
10	<i>Alstonia scholaris</i>	Chatni
11	<i>Anogeissus latifolia</i>	Dhautha
12	<i>Antidesma ghaesembilla</i>	Bhabiranj
13	<i>Arotocarpus integrifolia</i>	Kathal
14	<i>Artocarpus lakoocha</i>	Barhar
15	<i>Bauhinia retusa</i>	Kathul
16	<i>Bauhinia purpurea</i>	Koemar
17	<i>Bauhinia recemosa</i>	Katmauli
18	<i>Azadirachta indica</i>	Neem
19	<i>Bauhinia variegata</i>	Kachnar
20	<i>Bombax ceiba</i>	Semal
21	<i>Boswellia serrata</i>	Salia
22	<i>Bridelia retusa</i>	Kajhi
23	<i>Buchenania lanzan</i>	Piar
24	<i>Butea frondosa</i>	Palas
25	<i>Careya arborea</i>	Kumbhi
26	<i>Casearia tomentosa</i>	Beri
27	<i>Cassia fistula</i>	Amaltas
28	<i>Chloroxylon swietania</i>	Bharhul
29	<i>Cordia macleodii</i>	Belwajan
30	<i>Cordia myxa</i>	Bahuar
31	<i>Cochlospermum gossypium</i>	Galgal
32	<i>Dalbergia lanceolaria</i>	Hardi
33	<i>Dalbergia latifolia</i>	Kala Shisham
34	<i>Dalbergia sissoo</i>	Shisham
35	<i>Diospyros embryopteris</i>	Madartendu
36	<i>Diospyros melanoxylon</i>	Tend / Kend
37	<i>Dillenia pentagyna</i>	Rai
38	<i>Elaeodendron mukorossi</i>	Ratangur
39	<i>Ehretia laevis</i>	Bhaire
40	<i>Emblica officinalis</i>	Amla
41	<i>Eugenia heyneana</i>	Katjamun
42	<i>Eugenia jamb</i>	Jamun
43	<i>Eugenia operculata</i>	Paiman
44	<i>Ficus benghalensis</i>	Bar
45	<i>Ficus cunia</i>	Parho
46	<i>Ficus histida</i>	Dimar
47	<i>Ficus religiosa</i>	Pipal
48	<i>Ficus tomentosa</i>	Barun
49	<i>Gardenia latifolia</i>	Papra
50	<i>Gmelina arborea</i>	Gamhar

51	<i>Grewia asiatica</i>	Patdhaman
52	<i>Grewia hirsuta</i>	Gursukhi
53	<i>Holarrhena antidysentrica</i>	Koreya
54	<i>Holoptelea integrifolia</i>	Chilbil
55	<i>Hymenodictyon excelsum</i>	Bhurkur
56	<i>Ixora parvifolia</i>	Lohajangin
57	<i>Kydia calycina</i>	Pula
58	<i>Lagerostroemia parviflora</i>	Sidha
59	<i>Lanea grandis</i>	Genjan
60	<i>Litsea sebifer</i>	Medh
61	<i>Madhuca latifolia</i>	Mahua
62	<i>Mallotus philippinensis</i>	Rohan
63	<i>Mangifera indica</i>	Mango
64	<i>Melia azedarach</i>	Bakain
65	<i>Michelia champaca</i>	Champa
66	<i>Mitragyna parviflora</i>	Gurikaram
67	<i>Morinda tinctoria</i>	Ach
68	<i>Morus spp.</i>	Tut
69	<i>Murraya exotica</i>	Kamini
70	<i>Oroxylum indicum</i>	Sonapatta
71	<i>Ougeinia oojenensis</i>	Sandam
72	<i>Polyalthia cerasioides</i>	Kudmi
73	<i>Pongamia glabra</i>	Karanj
74	<i>Pterocarpus marsupium</i>	Bia
75	<i>Randia uliginosa</i>	Piurar
76	<i>Rubia cordifolia</i>	Jotsingh
77	<i>Saccopetalum tomentosum</i>	Kari
78	<i>Sapindusmukorossi</i>	Ritha
79	<i>Schleichera oleosa</i>	Kusum
80	<i>Schrebera swenioides</i>	Ghato
81	<i>Semecarpus anacardium</i>	Bhelwa
82	<i>Shorea robusta</i>	Sakhua
83	<i>Soymida febrifuga</i>	Rohena
84	<i>Spondias magnifera</i>	Amra
85	<i>Sterculia urens</i>	Keonjhi
86	<i>Stereospermum suaveolens</i>	Padar
87	<i>Tamarindus indica</i>	Imli
88	<i>Tectona grandis</i>	Sagwan
89	<i>Terminalia arjuna</i>	Arjun
90	<i>Terminalia belerica</i>	Bahera
91	<i>Terminalia chebula</i>	Harra
92	<i>Terminalia tomentosa</i>	Asan
93	<i>Toona ciliata</i>	Toon
94	<i>Vangueria pubescens</i>	Katai

95	<i>Wendlandia exerta</i>	Tiril
96	<i>Zizyphus mauritiana</i>	Ber
97	<i>Zizyphus xylopyra</i>	Katber

**SHRUBS AND HERBS**

1	<i>Achyranthus aspara</i>	Chirchri
2	<i>Andrographis paniculata</i>	Kalmegh
3	<i>Antidesma diandrum</i>	Amti
4	<i>Asparagus racemosa</i>	Satwara
5	<i>Berberis aristata</i>	Kashmoi
6	<i>Calotrophis gigantean</i>	Akaon
7	<i>Carisa carandas</i>	Kanwar
8	<i>Carisa spinarum</i>	Jangli karonda
9	<i>Cassia tora</i>	Chakor
10	<i>Cleistanthus collinus</i>	Kargali
11	<i>Clerodendron infortunatum</i>	Bhant
12	<i>Colebrookia oppositifolia</i>	Binda
13	<i>Croton oblongifolius</i>	Putrid
14	<i>Emblica robusta</i>	Baborang
15	<i>Euphorbia hirta</i>	Dhudhi
16	<i>Flacourtia ramontchi</i>	Katai
17	<i>Flemingia chappar</i>	Galphuli
19	<i>Flueggia obovata</i>	Sika
20	<i>Gardenia turgida</i>	Dhanuk
21	<i>Gardenia gummifera</i>	Dekamali
22	<i>Glochidion lanceolarium</i>	Chiku
23	<i>Helicteres isora</i>	Aitha
24	<i>Hypericum gaitii</i>	Gaiti
25	<i>Indigofera pulchela</i>	Jirhul
26	<i>Lantana camara</i>	Putus
27	<i>Limonia acidissima</i>	Belsain
28	<i>Mimosa pudica</i>	Lajwanti
29	<i>Nyctanthes arobortristis</i>	Harsingar
30	<i>Phoenix acaulios</i>	Khejur
31	<i>Randia dumetorum</i>	Mowar
32	<i>Rauwolfia spp.</i>	Chandra
33	<i>Solanum nigrum</i>	Makoi
34	<i>Solanum xanthocarpum</i>	Rengni
35	<i>Sophora bakeri</i>	Jirhul
36	<i>Storobilanthus auriculatus</i>	Marmaridara
37	<i>Swertia pulchella</i>	Chiretta

38	<i>Symplocas racemosa</i>	Lodh
39	<i>Tephrosia purpurea</i>	Sarpuka
40	<i>Thespesia lampas</i>	Kapasi
41	<i>Urginea indica</i>	Jangli pija
42	<i>Ventilago maderaspatana</i>	Keonti
43	<i>Vitex negundo</i>	Sindwar
44	<i>Wrightia tinctoria</i>	Adhkapar
45	<i>Woodfordia fruticosa</i>	Dhawai
46	<i>Zizyphus oenoplia</i>	Dhathora

**CLIMBERS, PARASITES, SEMI-PARASITES, ORCHIDS**

1	<i>Abrus precatorius</i>	Karjani
2	<i>Acacia pennata</i>	Arar
3	<i>Bauhinia vahlii</i>	Maholan
4	<i>Butea Parviflora</i>	Cihut
5	<i>Butea superba</i>	Dorang
6	<i>Casytha spp.</i>	
7	<i>Combretum decandrum</i>	Phalandur
8	<i>Cryptolepis buchanani</i>	Dudhia lar
9	<i>Cuscuta reflexa</i>	Alaj-jori
10	<i>Habenaria susannae</i>	Orchid
11	<i>Ichnocarpus frutescens</i>	Saon lar
12	<i>Loranthus spp.</i>	Banda
13	<i>Millettia auriculata</i>	Gurnar
14	<i>Momordica dioica</i>	Keksa
15	<i>Mucuna prurita</i>	Alkosi
16	<i>Mukia maderaspatana</i>	Bilari
17	<i>Pogonia spp.</i>	Orchid
18	<i>Porana paniculata</i>	Bhidia lar
19	<i>Pueraria tuberosa</i>	Patal konhra
20	<i>Smilax macrophylla</i>	Ram datwan
21	<i>Smilax prolifera</i>	Ram datwan
22	<i>Vanda spp.</i>	Orchid
23	<i>Viscum spp.</i>	Banda
24	<i>Vitis latifolia</i>	Khopri
25	<i>Vitis repanda</i>	Harjorwa

### GRASSES, BAMBOO AND AGAVES

1	Agave spp.	Moraba
2	Apluda varia	Dudhia sauri
3	Arundinella setosa	Motaminijhar
4	Bambusa arundinacea	Bara bans
5	Chrysopogon aciculatus	Chor kanta
6	Chrysopogon mountanus	--
7	Cymbopogon martini	Nanha dudhe grass
8	Cynodon dactylon	Doob
9	Dendro calamus strictus	Bans
10	Eulaliopsis binata	Sabai
11	Imperata arundinacea	chero grass
12	Imperata cylindrica	Ulu
13	Hetropogon contortus	Sauri grass
14	Panicum Montana	Khrj
15	Saccharum munja	Munj
16	Thysanolaena agrostis	Jharu grass
17	Vetiveria zizanioides	Khus-khus

#### **Bamboos in Bihar & Jharkhand:**

India has very rich diversity of Bamboos. There are 130 indigenous and exotic species under 23 genera found naturally or under cultivation. Out of the above 20 species and 4 genera are naturally growing or cultivated in the state of Bihar & Jharkhand. Most common species are Bambusa balcoa, B. nutans, Dendrocalamus strictus and endemic species is Dendrocalamus sericeus, which needs ex-situ conservation.

### **11. FAUNAL BIODIVERSITY:**

#### **ANIMALS:**

<b>Name</b>	<b>Zoological Name</b>	<b>Hindi name</b>
The Indian Wild Boar	Sus Scrofa Linnaeus	Suar
Spotted Deer	Axis axis	Chital
The Hog Deer	Axis porcinus	Para
The Sambar	Cervus Unicolor Kerr	Sambar
The Swamp Deer	Cervus Duvauceli Cuvier	Barasingha

The Nilgai	Boselaphus Tragocamelus	Nilgai
The Fourhorned Antelope	Tetracerus Quadricornis	Chowsingha
The Black Buck	Antilope Cervicapra	Mriga
Indian Gazelle	Gazella gazella	Chinkara
The Wild Buffalo	Bubalus bubalis	Arna(M);Arni (F)
Indian Bison	Bos garus	Gaur
The Indian Elephant	Elephas maximus Linnaeus	Hasti, Gaja
The Indian Hare	Lepus nigricollis	Khargosh
The common House Rat	Rattus rattus	chuha
The long tailed tree mouse	Vandeleuria oleracea	
The white tailed wood rat	Rattus blanfordi	
The Indian bush rat	Golunda ellioti Gray	
Field mice	Mus booduga	
Metads	Millardia meltada	
Mole rats	Bandicota bengalensis	
Antilope rats	Tatera indica	
Five Stripped Squirrel	Funambulus pennanti	Gilheri
Three Stripped Squirell	Funambulus palmerum	
Common yellow Bat	Scotophilus heathi	
Tickell's Bat	Hesperoptenus tickelli	
Indian Pipistrelle	Pipistrellus coromandra	
Indian False Vampire	Megaderma lyra	
Short Nosed Fruit Bat	Cynopterus sphinx	
Ground Shrews	Suncus murinus	Chuchunder
Tree Shrews	Anathana ellioti	
The ratel	Mellivora capensis	Bejoo
The smooth Indian otter	Lutra perspicillata	Ud bilao
The Sloth Bear	Melursus ursinus	Bhalu
Indian wild dog	Cuon alpinus	Dhole, jungli kutta
The Indian fox	Vulpes bengalensis	Lomri
The jackal	Canis aureus	Gidhar
The wolf	Canis lupus	Bheriya
The stripped Hyena	Hyaena hyaena	Lakkar baghar
The small Indian mongoose	Herpestes auropunctatus	
The common mongoose	Herpestes edwardsi	Newal
Toddy cat	Paradoxurus hermaphroditus	Lakati
The small Indian civet	Viverricula indica	Kasturi
The jungle cat	Felis chaus	Jangli billi
The leopard cat	Felis bengalensis	Chita billi
The leopard	Panthera pardus	Tendwa
The tiger	Panthera tigris	Bagh
Hanuman monkey	Presbytis entellus	Langur
The rhesus macaque	Macaca mulatta	Bandar

**LIST OF MAMMALS IN PALAMU:**

<b>SL. NO.</b>	<b>ENGLISH NAME</b>	<b>LATIN NAME</b>
1	Antelope, Four-horned	Tetraceros quadricornis
2	Badger, Honey or Ratel	Mellivora capensis
3	Bat, Fulvous Fruit	Rousettus leschenaulti
4	Bat, Indian flying fox	Pteropus giganteus
5	Bat, short-nosed fruit	Cynopterus sphinx
6	Bear, Sloth	Melursus ursinus
7	Bison, Indian or Gaur	Bos gaurus
8	Boar, Indian wild	Sus scrofa
9	Cat, Jungle	Felis chaus
10	Civet, Common Palm	Paradoxurus hermaphroditus
11	Civet, Small India	Viverricula indica
12	Deer, Barking or Muntjac	Muntiacus muntjak
13	Deer, Mouse or Indian Chevrotain	Tragulus meminna
14	Deer, Spotted or Chital	Axis axis
15	Dog, Indian wild	Cuon alpinus
16	Elephant	Elephas maximus
17	Fox, Indian	Vulpes bengaliensis
18	Gerbille, India	Tatera indica
19	Hare, Indian	Lepus nigricollis
20	Hyena, Striped	Hyena hyena
21	Jackal	Canis aureus
22	Langur, Common	Presbytis entellus
23	Leopard or Panthar	Panthera pardus
24	Macaque, Rhesus	Macaca mulatta
25	Mongoose, Common	Herpestes edwardsi
26	Mongoose, Small Indian	
27	Mouse, Indian Field	Mus Booduga
28	Mouse, Long tailed Tree	Vendeleuria oleracea
29	Nilgai or Blue Bull	Boselephus tragocamelus
30	Pangolin, Indian	Manis crassicaudata
31	Porcupine, Indian	Hystrix indica
32	Rat, Bandicoot	Bandicota indica
33	Rat, Indian Bush	Golunda ellioti
34	Sambhar	Cervus unicolor
35	Shrew, Grey Musk	Suncus murinus
36	Squirrel, Indian Giant	Ratufa indica
37	Squirrel, Three-striped Palm	Funambulus palmarum
38	Tiger	Panthera tigris
39	Wolf	Canis lupus

## REPTILES

SL NO.	ENGLISH NAME	LATIN NAME
1	Boa, Red sand	Eryx johnni
2	Cobra, Indian	Naja naja naja
3	Cobra, king	Ophiophagus Hannah
4	Karait, Banded	Bungarus fasciatus
5.	Karait, Common	Bungarus caeruleus
6.	Python, Indian	Phython molurus
7	Snake, Rat	Ptyas mucosus
8	Viper, Russel	

## LIZARDS

1	Chamelion	Chamelion calcarata
2	Gecko, Indian house	Hemidactylus flaviviridus
3.	Lizard, Rock	Agama buber culatus
4	Lizard, Monitor	Varanus monitor

## FISH

1	Bata	Labeo bata
2	Labeo kalbasu	
3	Katla	Catla catla
4	Magur	Clarias batrachus
5	Mirgal	Cirrhina mrigala
6	Rohu	Labeo rohita

## INSECTS

SL. NO.	ORDER/FAMILY	NAME
1	Poduridae	Achorutes armetus
2	Dictyoptera	Balata arientelis
3	Dictyoptera	Mantis religiosa
4	Pentatomidao	Nozara virudula
5	Pyrrhocoridae	Dysderous cinzulatus

6	Formicidae	Componotus compressus
7	Formicidae	Solepopsis
8	Anidae	Monorium spp.
9	Anidae	Apis dorsats
10	Anidae	Apis indica
11	Anidae	Apis spp.
12	Andrenidae	Andrena spp.
13	Bombidae	Bombus spp.
14	Vespidae	Polistis spp.
15	Ichneumonidae	Tchneumop spp.
16	Carabidae	Arthia spp.
17	Buprestidyae	Chrysochroa spp.
18	Coccinellidae	Coccipella septempunctata
19	Coccinellidae	Chilomenes s. maculata
20	Meloidae	Mylabris pustulata
21	Melolonthidae	Holotricha serrata

THE STUDY AND SURVEY REPORTS INCLUDED IN THE ACTION PLAN OF BIHAR FOR AQUATIC BIODIVERSITY, MOLLUSCS, ANNELIDS, AQUATIC INSECTS, FISHES AND AQUATIC ANIMALS ALSO REPRESENT THE BIOTA OF THE GANGETIC PLAINS OF SAHEBGANJ DISTRICT IN JHARKHAND. EVEN THE RIVERINE PROBLEMS AND OTHER FACTORS ARE TRUE FOR THIS PART OF THE JHARKHAND STATE.

## **12. FOREST:**

Forests in Jharkhand extend over 23605 sq.km. representing 29.61 % of the total geographical area of the State of which 82 % are Protected Forest and 17.5 % are Reserve Forest with a small amount of unclassified forests ( 33.49 sq.km. ).

Saranda seems to be the densest forest of the Jharkhand state. It is known to be the best Sal forest in Asia yet in existence. This is the naturally germinated Sal forest unlike other Sal forests elsewhere known as the high forest of the state.

The less high forests are lying in Kolhan, Palamu, Chatra, Topchachi and Parasnath etc. the condition of Hazaribagh forest has drastically degraded. There are very few forest patches in Dhanbad, Bokaro and Jamshedpur (except Dalma) region and hardly there is any forest left in Dumka, Deoghar and Godda area.

### **ORGANISATIONAL SETUP:-**

The Jharkhand state has developed a Wildlife Department separately to look over the protected areas. The Conservator of Forests, DFO, Range Officer, Forester and Forest Guards have been employed separately other than the regular departmental divisions. This system is basically different from the state of Bihar.

### **JHARKHAND FORESTS: AT A GLANCE**

#### **Recorded Forest Area**

Reserved Forest (RF)	: 4,387.20 sq. km.
Protected Forest (PF)	: 19,184.78 sq. km.
Unclassed Forest (UF)	: 33.49 sq. km.
<b>TOTAL</b>	<b>: 23,605.47 sq. km.</b>

#### **Forest Cover**

Dense Forest (Canopy density : >40%)	: 11,787 sq. km.
Open Forest (Canopy density : 10-40%)	: 10,850 sq. km.
Scrub Forest	: 976 sq. km.

**Forested and plantation Area:**

	Total area	Notified area		Forested area		Forested & Plantation area	
		Area	%	Area	%	Area	%
Bihar	94,163	6,473	6.87	5,720	6.07	9,413	10.00
<b>Jharkhand</b>	<b>79,714</b>	<b>23,605</b>	<b>29.61</b>	<b>22,637</b>	<b>28.4</b>	<b>25,331</b>	<b>31.78</b>
India	3,287,263	786,436	23.38	675,538	20.55	757,010	23.03

	Assessment 1999 in sq. km.(forested)			Assessment 2001 in sq. km (forested)			Diff.
	Dense	Open	Total	Dense	Open	Total	
Bihar	2,223	2,607	4,830	3,372	2,348	5,720	890
<b>Jharkhand</b>	<b>11,051</b>	<b>10,593</b>	<b>21,644</b>	<b>11,787</b>	<b>10,850</b>	<b>22,637</b>	<b>993</b>
<b>India</b>	<b>382,229</b>	<b>255,064</b>	<b>637,293</b>	<b>416,809</b>	<b>258,729</b>	<b>675,538</b>	<b>38,245</b>

**DISTRICT WISE FOREST COVER**

Number of Districts : 22

(Area in km<sup>2</sup>)

District	Geographic Area	Forest Cover				Scrub
		Dense Forest	Open Forest	Total	Percent	
Bokaro	1,929	270	304	574	29.76	58
Chatra	3,732	945	950	1,895	50.78	35
Deoghar	2,479	73	15	88	3.55	3
Dhanbad	2,996	70	104	174	5.81	21
Dumka (Includes Jamtara)	6,212	231	257	488	7.86	109
Garhwa	4,092	670	705	1,375	33.60	59
Giridih	4,963	324	459	783	15.78	26
Godda	2,110	163	227	390	18.48	22
Gumla (Includes Simdega)	9,077	1,231	1,255	2,486	27.39	58
Hazaribagh	5998	909	1,253	2,162	36.05	66
Kodarma	1435	229	387	616	42.93	3
Lohardaga	1491	392	165	557	37.36	11
Pakur	1571	79	215	294	18.71	17
Palamu (Includes Latehar)	8657	2,616	1,244	3,860	44.59	205
Paschimi Singhbhum	9907	2,103	1,624	3,727	37.62	84
Purbi Singhbhum (Includes Saraikela)	3533	597	288	885	25.05	60
Ranchi	7698	735	997	1,732	22.50	68
Sahabganj	1834	150	401	551	30.04	71

<b>TOTAL :</b>	<b>79714</b>	<b>11,787</b>	<b>10,850</b>	<b>22,637</b>	<b>28.40</b>	<b>976</b>
----------------	--------------	---------------	---------------	---------------	--------------	------------

**DIVISIONWISE DETAILS OF FOREST AREA**

<b>Sl. No</b>	<b>Name of the Forest Division</b>	<b>Reserved Forest (ha.)</b>	<b>Protected Forest (ha.)</b>	<b>Unclassed Forest (ha.)</b>	<b>Total Forest Area (ha.)</b>
1	2	3	4	5	6
1.	Saranda	81808	3988	86	85882
2.	Kolhan	58716	11258	68	70042
3.	Porahat	50628	15816	98	66542
4.	Chaibasa South	31	50875	-	50906
5.	Chaibasa North	6486	61540	-	68026
6.	Dhalbhum	53050	51863	-	104913
7.	Ranchi East	11742	80182	-	91924
8.	Ranchi West	26290	73744	-	100034
9.	Gumla	12101	118717	16	130834
10.	Giridih	8776	113020	-	121796
11.	Hazaribagh West	673	176524	340	177537
12.	Hazaribagh East	1743	102055	-	103798
13.	Bokaro	-	51901	-	51901
14.	Chatra South	752	101828	-	102580
15.	Chatra North	-	93372	-	93372
16.	Koderma	15630	73408	-	89038
17.	Dhanbad	10825	15555	-	26380
18.	Daltonganj South	58081	46044	45	1041170
19.	Daltonganj North	3987	126661	-	130648
20.	Garhwa South	549	123586	-	124135
21.	Garhwa North	-	78705	-	78705
22.	Latehar	20648	111736	-	132384
23.	Deoghar	2866	73922	-	76788
24.	Dumka	12803	135389	420	148612
25.	Sahabganj	50	10471	2276	12797
26.	Giridih Afforestation	485	16318	-	16803
<b>TOTAL :</b>		<b>438720</b>	<b>1918478</b>	<b>3349</b>	<b>2360547</b>

**ORGANIZATIONAL STRENGTH OF THE FOREST DEPARTMENT**

<b>Cadre</b>	<b>Authorized Strength</b>	<b>Working Strength</b>
--------------	----------------------------	-------------------------

Indian Forest Service	130	116
Jharkhand Forest Service	156	137
Range Officer of Forests	383	224
Forester	1056	726
Forest Guard	3383	2050

## SANCTUARIES AND NATIONAL PARKS OF JHARKHAND

### Wildlife and Environment Protection:-

The State Govt. is determined for the protection and development of the wild life. The State is having one National Park, Ten Sanctuaries, One Biological Park and two other small reserves.

Sl. No	Name	District	Legal Statutes	Date of Notification	Area (In sq. km.)	Name of the Division	Principal Animals
1	2	3	4	5	6	7	8
1.	Betla National Park	Palamu	N.P.	10.9.86	231.67	FD, Project Tiger, Daltonganj	Tiger, Gaur, Deer
2.	Palamu Sanctuary	Palamu	N.P.	17.7.76	794.33	FD, Project Tiger, Daltonganj	Elephant, Gaur, Sambhar
3.	Hazaribagh Sanctuary	Hazaribagh	s	24.5.76	186.76	DFO, Hazaribagh West Division	Tiger Panther, Wild Boar, Hyena
4.	Mahuadanr Wolf Sanctuary	Palamu	s	23.6.76	63.25	DFO, Daltonganj South Division, Daltonganj	Wolf, Spotted Deer, Wild Boar
5.	Dalma Sanctuary	Singhbhum East	s	23.6.76	193.22	DFO, Wildlife Division, Ranchi	Elephant, Mouse Deer, Barking Deer, Wild Boar
6.	Topchanchi Sanctuary	East Dhanbad	s	3.5.78	8.75	DFO, Dhanbad Division	Panther, Langoor, Barking Deer, Wild Boar
7.	Lawalong Sanctuary	Chatra	s	7.8.78	207.00	DFO, Chatra South Div. Chatra	Tiger, Panther Wild, Boar Langoor, Sambhar Nilgai, Spotted Deer Hyena Barking Deer
8.	Koderma Sanctuary	Hazaribagh	s	25.1.85	177.95	DFO, Koderma Division, Koderma	Sambhar, Leopard, Barking Deer, Blue Bull
9.	Parasnath Sanctuary	Giridih	s	2.8.81	49.33	DFO, Giridih Div.	Sambhar, Leopard, Barking Deer, Blue Bull
10.	Palkot Sanctuary	Gumla	s	22.8.90	183.18	DFO, Gumla Div.	Panther
11.	Udhwa Lake Bird	Sahabganj	s	1991	5.65	DFO, Social Forestry Div.	Migratory Birds

	Sanctuary					Sahabganj	
12.	Gautam Budha Sanctuary	Hazaribagh	s	1971	100.00	DFO, Koderma	Sambhan, Leopard, Blue bull.

No.	Name of Sanctuaries	Name of Animals														
		Tiger	Leopard	Cheetal	Barking Deer	Sambhar	Wild Boar	Neelgai	Langur	Gaur	Wolf	Elephant	Wild Dog	Sloth Bear	Rhesus Monkey	Black Buck
1	Gaya Wildlife Div	7	4	3390	1260	1290	600	30	1260	-	30	1	-	690	1200	-
2	Hazaribagh West	3	15	102	49	101	90	-	45	-	12	-	136	-	-	-
3	Hazaribagh East	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-
4	Daltonganj North	4	2	-	-	-	-	-	-	-	-	9	-	-	-	-
5	Chaparan Div-I	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Chaparan Div-II	44	30	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Kodarma Div	1	2	87	-	-	-	-	-	-	-	-	-	-	-	-
8	Gaya Div	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	Bhojpur Div	-	-	-	-	-	-	2995	-	-	-	-	-	-	-	766
10	Dhanbad Div	-	6	12	-	-	116	-	-	-	-	-	-	-	-	-
11	Ranchi East Div	-	2	-	-	-	-	-	-	-	-	8	-	-	-	-
12	Saranda Div	12	16	2	-	16	103	-	-	70	-	135	-	23	-	--
13	Garhwa South Div	11	2	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Shahabad Div	3	25	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Palamu Tiger Reserve	44	68	15232	2029	2758	7741	138	31079	721	259	119	435	118	35098	-
16	Dalma Wildlife Sanctuary	-	2	-	21	-	88	-	18	-	2	61	2	32	288	-
17	Giridih Div	-	3	-	-	-	386	-	-	-	-	-	-	-	864	-
18	Porahat Div	-	5	-	14	-	65	-	2	-	-	108	-	23	375	-
19	Dhalbhum Div	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
20	Kolhan Div	-	-	-	-	-	-	-	-	-	-	130	-	-	-	-
21	Chaibasa South Div	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-
22	Rajgir Sanctuary	-	-	-	-	-	294	218	136	-	-	-	-	-	-	26
23	Sahabganj SF Div	-	3	--	-	-	241	-	-	-	-	-	-	-	-	-
24	Latehar Div	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Chatra South Div	1	7	626	198	66	66	-	-	-	-	17	-	-	-	-
26	Chatra	-	2	188	18	6	311	5	-	-	-	-	-	1	-	-

North Div																
Total	137	201	19639	3652	4237	10101	3386	32540	791	312	657	573	887	37825	792	

## **Wildlife Sanctuaries:**

### **BETLA NATIONAL PARK**

Palamu's Betla National Park offers a fascinating study of wild life in natural surroundings studded with forests, hills and valleys. The Betla National Park, first established as a sanctuary and later upgraded to its present status, has carved a niche for itself within short span of its life. The National Park occupies an area of 250 sq. km. on both the sides of all weather Mahuadans Road taking off from the main Ranchi-Daltonganj road on 11th km post as one comes from Daltonganj, the distance from Ranchi being 156 km. Ranchi is connected by road. Regular passenger buses fly between Ranchi and Daltonganj town from where Betla is only 25 km away. A number of buses are in operation between Daltonganj and Betla. The national park has a large variety of wild life. Once Betla had 2 tigers, 50 elephants, 800 Sambhars, hundreds of wild boar and pythons as big as 15 to 20 feet. Most innocent of the lot are the spotted deer seen moving in herds. The park authorities provide jeep fitted with a search light to the visitors for a fixed fair. As the light falls on the herds of deer, they watch innocently with eyes glowing like green electric bulbs. Scared rabbits and foxes scamper about and the wild boar rustle in the layers. The most coveted sight is a majestic gaur popularly known as bison. It leisurely walks across the road as if saying, who is afraid of you. The elephants uproot bamboo and fell them on roads for apparently obstructing free plying of buses. The mammalian fauna to be seen at Betla include langur, rhesus, cheetal (spotted deer), blue bulls and wild boars. The lesser mammals are the porcupine hare jungle cat, honey badger, jackal, malabar giant squirrel and mongoose wolf, antelope etc. The park was declared in 1974 a tiger project reserve.

### **JAIVIK UDYAN (ZOOLOGICAL PARK)**

About 16km from Ranchi town on Ranchi - Patna road near Ormanjhi, is the zoological garden named Jaivik Udyan. A number of mammalian faunas have been collected there for visitor's gaiety.

### **HAZARIBAGH NATIONAL PARK**

Hazaribagh National Park, about 135 km from Ranchi is also a sanctuary adorned with scenic beauties. The park has also the same features as that of Betla to some extent. The park has tigers, panthers, sambhars, spotted deer, bisons and a number of mammalian faunas. There are some towers, which the tourists use to behold the beasts. A canteen is also there to cater. The park is approachable by all weather-metalled road.

### **Palamu Tiger Project**

For reduction in the dependence of villagers on wildlife habitats the Global Environment Fund and GOI has sanctioned a scheme of Rs. 38.00 crores for economic development of 191 villages in around Palamu tiger reserve. This eco-development is scheduled to end in

the year 2001-2001 but due to various procedural delays till date only 194.034 lakhs have been spent. The GOI have already released 1.5 crores so far to the state of Jharkhand. The establishment cost of the Palamu Tiger reserve is borne by the State Government.

Included under first batch of tiger Project Scheme of GOI, this reserve has 226.32 sq. kms. under National Park and 753.65 sq. km. under Sanctuary. Must prestigious area for forest dept. and very rich in biodiversity components for conservationists:

1. **Ecosystem** : Forest, dry deciduous, mixed with Bamboo brakes, Sal forests (moist high level, moist low level and dry peninsular) and a eagle forests. Full of valleys, ridges, undulating terrain, South west part has elevation of nearly 1000 meters and northern part is nearly 220 meters.
2. **Wild Species** : Much Diversified.
  - (a) **Plant** : 97 Species of flowering, 46 sps. of shrubs and herbs, 28 sps. of climbers, Parasites, Semi parasites, orchids and 27 sps. of grasses were identified. 187 sps. of plants were identified having medicinal values and used by local tribal communities.
  - (b) **Animals** :
    - (i) 19 sps. of mammals including Tiger, Elephant, Gaur, Giant Squirrel, Bear and Shrews.
    - (ii) 19 sps. of reptiles includes chameleon, Russell's viper, Cobra, Krait, Pythons, Varanus.
    - (iii) 7 Species of Amphibians, 87 species of hill stream fishes identified.
    - (iv) 178 species of birds were identified and recorded so far.
    - (v) Invertebrates include varieties of insects and also terrestrial planarians.

**Importance of conservation:**

- (a) **Social & Ethnic:** Tribals of Jharkhand have traditional worshiping of trees and animals. A small part of forest is declared as 'Sarna', which is attributed to worship, marriages and other rituals. The festivals is Karma (worshiping of Karam tree), Sarhul (worshiping of Sal tree) etc. are linked to forests & wild life conservation. No tribal want to harm forests if external forces are removed.
- (b) **Medicinal:** Tribal doctor "Baiga", mostly from Korwa community has greet knowledge of medicinal values of plants and animals.
- (c) **Food:** Various types of tubers, honey and wild life are used as food to local communities.
- (d) **Commercial:** Collection and trading of MFP, honey, silk cocoons, and medicinal plants are common for sustenance.

- (e) **Nuissance:** The raiding of crops by wildlife, snake bites, cattle killing, goats lifting by wolves are some of the nuisance value to local communities.
- (f) **Scientific:** Wild species of cultivated plants are in plenty, which has gene value. The diversity in animal and plant life owing of different ecological, zonation is worth study. The mixture of local and gaugetic zone plants and animals form a curious mixture of biological diversity represented in this area.

### **Project Elephant**

The State Govt. has declared 9406 sq.km. of Forest area covering 17 forest divisions as Elephant Project area to improve the elephant habitat , Greening of elephant corridors, developing wireless networking system and proper driving away of the elephants from the habitated areas. Govt. of India is funding this project. "Singhbhum Elephant Reserve " is the only elephant reserve in the country.

### **Establishing a corridor for the elephants of Jharkhand using Remote Sensing and Geographical Information System (GIS):**

The Asian Elephant has declined primarily because of reduction in habitat than captures (Sukumar, R., 1989). In the state of Jharkhand in India, these things are exactly true. There being maximum 'Makhanas' poaching is not a major issue. (Evaluation Report) but the shrinkage of habitat is. With a maximum likely population of 750 elephants in the state (Annexure III, Evaluation Report), the corridor for the movement of the elephants have not all been mapped, the mapping requires systematic identification of the migratory routes and off late the recent changing trends reported in these routes.

### **Bio-geographical Assessment of Elephant Habitats in Jharkhand**

Elephant herds migrate long distances in search of food. This allows the vegetation to regenerate after the herd passes through an area. The matriarch leading the herd follows traditional migration routes, which may have been in use for centuries.

### **Food taken by elephants consists of**

**Grasses-**

<b>Latin Name</b>	<b>Local Name</b>	<b>Users</b>
Chloria indica	Phulena	Elephants
Chloria infortunata	Narcha	Elephants
Cynodon dactylon	Doob	Elephants

Chrysopogan montanus	Dudhi	Elephants
Dendrocalamus strictus		Elephants
Eragrotia pilosa	Kush	Elephants
Heteropogan contortus	Chorant	Elephants
Phragmites karka	Narhi	Elephants
Sataria gloca	Siara	Elephants

#### Crops-

Latin Name	Local Name	Users
Cicer arietinum	Chana	Elephants
Eleusine coracana	Marua	Elephants
Hordeum vulgare	Bajra	Elephants
Oryza sativa	Dhan	Elephants
Saccharum officinarum	Ketari	Elephants
Setaria italica	Sanwa	Elephants
Triticum aestivum	Genhu	Elephants
Zea mays	Makai	Elephants

#### Fruits-

Botanical Name	Common Name	Users
Aegle marmelos	Bel	Elephants
Engenia jambolana	Jamun	Elephants
Ficus glomerata	Gular	Elephants
Mangifera indica	Aam	Elephants
Musa sapientum	Kala	Elephants

#### Other Shrubs and Trees

Botanical Name	Users
Dendrocalamus strictus	Elephants
C. indica	Elephants
C. decurva	Elephants
M. contortus	Elephants
Helicteres isora (leaves)	Elephants

#### Elephant Numbers Increased in Dalma

The latest census in the Dalma Wildlife Sanctuary has reported a small increase in the number of Elephants here. While the number counted in 1997 was 79, it is now said to be 82. This includes a large number (18) of young ones.

The census has also reported an increase in the number of other animals like the wild boar, Barking Deer and Bear. The population of Hyenas and Wolf has however

registered a steep fall. (Source: Baby boom in Dalma sanctuary 11/9/01)

### **First Elephant Reserve in Jharkhand :**

The Jharkhand government has announced the creation of an elephant reserve, the proposal for which has been accepted by the Central Government.

Rs. 6.25 crores has been sanctioned by the center for work to be undertaken in Ranchi, Sighbhum, Gumla, Hazaribagh, Chatra, Latehar and Daltonganj. The state has proposed to use money for the large-scale Bamboo plantations and for the construction of huge reservoirs for the Elephants. (Source: Abhijit Sen, Country's first elephant reserve in Jharkhand, TOI, 10/10/01)

### **13. PROBLEMS:**

The state of Jharkhand is known for the forests and tribals. But at present as a reality, the whole forest of Jharkhand has become a sanctuary for the extremists. The extraction and heavy exploitation for timber, forest produces, mining and industries have been mainly responsible for depletion of the forest cover and converting the vast tract of land into wasteland. Reclamation of wastelands for human uses has left animal life and precious forest wealth vulnerable or declining with no end in the sight. Gradually many forest areas might have been converted to agricultural land. It is generally observed that where human compete with wild life the wildlife often loses. A worrying ecological condition is obvious in some of the forests of Jharkhand, where on going conflicts between the tribals as the cultivators and Govt. agencies.

With changing socio-cultural scenario, commercialization, politicization and criminalisation a new profession has emerged with amazing rapidity in the forests today is poaching, trade, exploitation of timber, herbs and forest produces etc.

### **State Boundary:**

The riverine bed of about 100 km. in the district of Sahabganj is a unique gift to the state with plentiful water resources and aquatic biodiversity, which is entirely different of the typical character of the state. This area consist of the only Bird sanctuary of the Jharkhand state i.e. Uduwa lake Bird sanctuary and many true wetlands like Chand shahar lake harbouring rich avian fauna and other aquatic biodiversity. But the major problem of the area is that after almost three and half year of the division from Bihar yet the geographical area of Jharkhand in this Gangetic belt has not been identified and demarcated. This causes many problems for the state in implementing its strategies.

### **NATURAL CALAMITY: Flood & Droughts:**

While major parts of Jharkhand lie under the threat of drought due to lack in rain water holding capacity, other parts are facing floods, which affects lakhs of people in the state. The Sahabganj district is worst affected. Hundreds of villages in Sahabganj district are affected regularly but sometimes many villages of Garhwa district have also been

affected. The officials blame it to Uttar Pradesh for Garhwa flood. It was alleged that U.P. releases excess water from Rihand Dam without informing Jharkhand about it. Drought is witnessed often from majority of the districts of Jharkhand.

## **Water problem**

- 90 – 95 per cent of the rainfall is wasted as untapped runoff
- Depleting groundwater
- In 22 districts – the entire state was affected by drought in 2002
- Floods affected 150,000 lives
- In 113 Blocks of 13 Districts - drought conditions prevailed in 2003
- Surface and groundwater contamination (biological, heavy metals – fluoride, manganese, nickel and sulphate)

## **Survey:**

The data related to the biodiversity especially about the flora, fauna, forest & wildlife seems to be **too old** and might not be giving the true picture of the present. The biodiversity of the state needs a fresh and authentic survey as the state is newly born.

Not many study and survey activities are being conducted in the State at present as the many forest areas are highly disturbed and inaccessible due to the problems of the **extremists** like MCC, Naxalites, People War Group, Party Unity, Lalkhandis, some timber and Kattha Mafias etc. Even the forest officers hardly dare to enter the forests of Jharkhand. It is almost impossible for them to assess the status of any biodiversity of the forests. The data being produced mainly based on speculation.

Much **information are scattered**, not highlighted and stored in the pockets here and there.

## **Lack of resource persons:**

There are very few skilled and interested individuals and organizations active in the field of biodiversity.

## **Natural Resources:**

These precious **plant fossils** are getting destroyed due to active mining business, crusher operations, Jhum cultivation and unmindful collection of these natural gifts. Mining activities are so frequent and vast that they denuded the forests and have left a legacy of out crop excavations and dangerous quarries. It has done immense damage to the fossils flora of Rajmahal hills and if these practice is not checked now, the entire treasure will be permanently lost, and we can't get back the multi million years old natural gift once again at any cost.

## **Tribes:**

**Pahariyas facing extinction:** The ambitious plan of district administration aimed at ameliorating the socio-economic condition of the Pahariya tribes of this region by involving them in State and Central Government schemes still remains in nascent stage. The tribals are facing threat of extinction due to malnutrition, high neo-natal death rates, and no proper medical and health care system, says Ganaori Munchi, the District Pahariya Welfare Officer.

**Baiga** is the traditional doctor of the tribals. For any illness the tribals use to go for their traditional method of herbal treatment. But the modernization and development of missionary culture, this indigenous knowledge is being lost for ever.

## **Flora:**

### **Threats to the Flora:**

North-eastern region of Jharkhand is rich in mineral resources which are mainly confined to different localities of Rajmahal hills. There are two types of mines: minor and major. Minor mines include road metal and sand mines. Major mines include bentonite, china clay, flint stone, fire clay, quartz, Kao line, Keolinised sand, Red oxide, Silica sand, Yellow oxide, soap stone and coal. Of these coal, china clay and road metals are abundantly found in this area and are being exploited by government, semi-government and private agencies on large scale. Coal is mainly found in lower Gondwana horizon.

Different developmental activities and mining have severely damaged the natural habitats thus threatening the survival of several native species. Our studies have revealed that following taxa may vanish from Santhla Pargana region if conservation measures, both *in situ* and *ex situ*, are not taken immediately.

Rare and threatened species in the flora of Santhla Pargana include *Atlantia monophylla*, *Beilschmiedia dalzellii*, *Bischofia javanica*, *Byttneria grandifolia*, *Caralia brachiata*, *Clematic goiuriana*, *Clerodendrum serratum*, *Cordia macleodii*, *Derris cuneifolia*, *Drosera burmanii*, *D. indica*, *Entada pursaetha*, *Euphorbia explanata*, *gastrochilus inconspicuus*, *Gloriosa superba*, *Hyptianthera stricta*, *Iphigenian indica*, *Lasia spinosa*, *Lepisanthes rubiginosa*, *Neuracanthus tetragonostachys*, *Pelatanthera insectifera*, *Rauvolifia serpentine*, *Salix tetrasperma*, *Siphonodon celastrineus*, *Tacca lontopetalodes*, *Vitex glabrata*, *V. peduncularis*, *Writia arborea* and *Xylosma longifolia*.

Plants depleting fast from north-east Jharkhand include *Antidesma acidum*, *A. ghaesembilla*, *Ardisia solanaceae*, *Baliospermum montanum*, *Bauhinia variegata*, *B. purpurea*, *B. vahlii*, *Bridellia squamosa*, *B. verrucosa*, *Butea superba*, *Callicarpa arborea*, *Casearia graveolens*, *Diospyros Montana*, *D. melanoxyton*, *Ehretia laevis*, *Embelia tsjeriam-cottam*, *Embelica officinalis*, *Hiptage benghalensis*, *Homonium riparia*, *Kydia calycina*, *Lisea monopetala*, *Mallotus repandus*, *Marsdenia tenacissima*, *Miliusa velutina*, *Mitragyna parviflora*, *Ochna obtusata*, *Oxalys scandens*, *Oroxylum indicum*, *Pterocarpus marsupium*, *Polyalthia suberosa*, *Semicarpus anacardium*, *Symplocos racemosa*, *Sterculia urens*, *Terminalia bellirica*, *T. chebula*, *Vitex peduncularis* and *Wrightia tomentosa*.

Of all the localities where intense mining is being done, Motijharna is the most disturbed one; it is the most beautiful waterfall in whole of the Rajmahal hills. For the past two decades, we have been surveying the flora and monitoring the floristic changes brought about by mining of road metals in Motijharna and adjoining areas (Varma and Pandey, 1995, 1998; Pandey & Varma, 2004). An analysis our data reveals that at present mining operation in whole of Rajmahal hills includes three phases: (1) removal of a large number of plant species (2) human settlement in the mining areas which has resulted in excessive denudation of surrounding vegetation and (3) mines left abandoned after mining.

Due to various reasons there is great change in physiognomy of the forests of Rajmahal hills. A fairly large number of species mentioned by Haines (1921-1925) in Botany of Bihar and Orissa are not found now, whereas a number of alien species (e.g. *Chromolaena odorata*, *Parthenium hysterophorus*, *Lantana camara*) have been introduced and have rather become naturalized in the flora. Our survey has revealed that there is a single tree of *Siphonodon celastrineus* is left at hill top of Motijharna which has now become endangered.

### **Negligence of the state Govt.:**

The govt. officials initially had not taken the matter of extremism seriously. They had been easy going in their practice. As a result the extremism has become a curse for them and taken toll of many lives of their officers and staff especially from the department of Police and Forests. Now they have raised a parallel govt. inside every forest. The govt. seems to be on the compromising stand. For any developmental work they have to depend upon the desire of the extremists. Some sources say that the officials pay a good percentage of the development fund to them to make them agreeable. The extremists have even made the bunkers for their protection inside the forests and are lashed with every modern weapon. They don't allow the govt. officials to develop a road network in their area for their safety profile.

### **Pollution:**

**Plastic** – High court has banned on the use of plastic of less than 20 microns and govt. also has issued instructions but it is not being implemented at all anywhere in the state while plastic is being one of the major pollutant for human health, degrading edible items, destroying fertile land and hazardous for animals that swallow it along with the food in the garbage.

### **Forest:**

The Jharkhand state has developed a Wildlife Department separately to look over the protected areas. But this system has only 4 DFOs in the state. One for Palamu, PTR, one for Ranchi, one for Dalma area and the 4<sup>th</sup> one based at Hazaribagh has to look for the protected areas namely Topchachi, Parasnath (Giridih) and Udhuwa (Sahabganj). The distance between these protected areas is as far as about 400 km. where there are only

one Range officer, one Forester and five Forest guards only. This could be easily assessed how feasible is the set up lacking negligible staff for monitoring and development.

Few forest officers opine that stopping any activity in the core protected areas of the forests give rise to the tall trees encroaching upon the open type bushy typical **tiger habitat**. This could be one of the factor of tigers coming out in the buffer area and the chances increase of their stray else where outside the forest.

The state is devoid of **inter departmental coordination** put extreme difficulties in implementing various developmental programmes.

### **Protected Areas:**

Jharkhand with its 11 sanctuaries and national parks is reeling under the similar status, threats & conservation issues. The condition of PAs and non PA areas are gradually deteriorating.

The biodiversity components are gradually deteriorating in all the areas. The serious conservation effort is needed. The fund is misutilised on unproductive purposes.

- (1) Extremist presence in every forest is taken as sole reason of decline.
- (2) Non co-operation from village communities, politicians, other departments of the government.
- (3) Less field staff, almost stoppage of antipoaching operations, development of informer system, untrained officers and staff and dedication towards conservation is lacking.
- (4) Elephants of elephant reserve are moving away and formed fragmented population groups in non-elephant areas causing heavy damages both to elephant & man. The lack of co-ordination and study in this phenomenon is detrimental to elephant management in state.

### **Palamu:**

Several species are on the verge of disappearing from the area i.e. Four horned Antelope, Blue bull, Barking deer, Mouse deer, Leopard cat, Black Partridges and of course Tigers. Kutku dam would submerge 13 villages and it would change the landscape. Road and Railways intersect the areas might disturb the migration route of the bigger animals like elephants. Mining activities clear the areas of forest and affect wildlife. Kattha is manufactured inside the forest near rivers and waterbodies. Its biscuits are sold in Varanasi etc. Teak is transported in Daltonganj. NTFPs e.g. Tendu leaves, Mahua flowers, Mahua seeds, Myrabolans, Honey, Thatch materials, Semul floss, Mushroom, Sal leaves, Sal seeds, Kusum seeds, lac, Karil, Firewood, Small timber, Poles, Bamboos, Medicinal Plants and other MFPs. Fire – approx 25.45 sq. Km. i.e. 2.01 % is burnt every year. It has doubly increased during last decade. Graziers deliberately lit fires for new grasses, poachers for driving animals for easy hunting, NTFPs collectors to clear grasses and shrubs etc. Natural fire occurs due to dry bamboos. Number of tourists has decreased to more than one third during last decade leading to unemployment to the

local people. Some areas are inaccessible during rainy season especially beyond Burha and N. Koel rivers. Nearly 85000 cattle graze in the forest of PTR, which sustains pressure of 206 villages inside and on fringes.

**Threats:**

- (a) Illicit felling – Teak, Khair etc.from Betla Area.
- (b) Grazing of 85000 cattles.
- (c) Non movement of field staff because of fear of extremists.
- (d) Antagonism of villagers on crop raiding by elephants & other wild life.
- (e) Extreme poaching.
- (f) Grant of mining of bauxite ore from Daltonganj(S) Division.
- (g) Closure of gates of North Koel dam will submerge nearly 70000 Acre of forests.
- (h) Overaged forest guards.
- (i) Nearly collapsed field management.
- (j) Excessive extraction of medicinal plants.

**Some other problems of Palamu Tiger Reserve:**

1. Illicit collection of fire wood and NTFPs (Non Timber Forest Produces)
2. Poaching e.g. Cheetal, Tigers, Barking Deers, Bison, Elephants
3. Wildlife trade
4. Poisoning e.g. Tigers and Hyena
5. Fire
6. Road & Railways construction
7. Tourism pressure
8. Weeds infestation
9. Encroachment for agriculture
10. Construction of Dam in Kutku
11. Tribal Hunting
12. Water scarcity
13. Untrained staff without orientation to conserve biodiversity
14. Inefficient implementation of management practices
15. Death of elephants due to low hanging electric wires.
16. Allowing state trading and NTFPs collection
17. Cattle Killing increases – lead to Poisoning & Poaching of wild animals
18. In undulating area rain water drains out leading to draught and lowering the water table in wells and ponds
19. Grazing animals compete with wild animals and spread diseases
20. Activities of social outfits of Party Unity, Naxalites, MCC and local criminals
21. Kattha Mafia
22. Some areas are inaccessible during rainy season

**Hazaribagh National Park:**

Hazaribagh National Park has suffered of the heavy loss of the forest and its wildlife during recent past. Some forest officials attribute it to a wolf pack in early 1980s,

which had started to take on to the human lives regularly. To eradicate this pack of the wolves from the forest the 'beat' had been organized to scan the forest for a long period and this disturbed all the wild animals that plied from the forest and strayed somewhere else. The forest officials claim to have 2 tigers in their forest of Hazaribagh but it is highly doubtful.

### **Udhuwa lake bird sanctuary:**

Udhuwa is the only bird sanctuary in the state of Jharkhand consisting of two lakes 'Pataira' and 'Berhale' lakes in the district of Sahabganj. The water level is directly dependant upon the level mentained at Farakka barrage in W. Bengal. But the major problem here is the heavy encroachment along the margin of the main deep water lake Pataura where hundreds of families have illegally settled. The area under recommended final notification is only central (a part of the lake in the center) water body where it is always difficult to enforce the protection measures. Many records are not available of the sanctuary and adjoining areas are creating another major problem to settle land dispute.

### **Elephants:**

**In** Jharkhand elephants are found in almost all the districts except Garhwa, Kodarma, Dhanbad, Pakur, Sahabganj etc., which get occasional stray population. In this state elephants occupy a habitat of approximately 6000 sq. km. A large number of elephant habitats in this region are small, degraded and have become isolated. Land fragmentation, encroachment; shifting cultivation and mining activities are the major threats to these habitats. The small fragmented habitats with interspersed agriculture land use in and around influence the range extension of elephants during wet season and have become a cause of concern for elephant –human conflicts. Long distance elephant excursions from Singhbhum and Dalbhum forests of the Jharkhand state of the adjoining states of Chhattisgarh (part of erstwhile M.P.), Orissa and west Bengal respectively had been a serious conservation problem since decades. While there was no earlier record of elephant presence in Chhattisgarh but the spilled over population from Jharkhand is causing great problems there yet from west Bengal they were displaced with forest losses. "Singhbhum Elephant Reserve " is the only elephant reserve in the country, which exists in this forest. The traditional routes of the elephants exist since time immemorial. But off late they are trying out new routes. In the process two group of elephant herds, one comprising of about 125 elephants and another of 25 elephants have been isolated from the Saranda forest and are trying to relocate themselves in the jungles of higher latitudes of the state i.e. in Hazaribagh district of the state. The group of 25 elephants has as high as 5 calves showing the stress this herd is going through. These are the herds, which are causing maximum man elephant conflict.

The elephant movement paths should be traced, rectified and geocoded.

The transportation network of the state was treated similarly.

All these layers were overlaid on each other to see the overall situation of the elephant traffic routes.

A 1km buffer was created for the transportation network and a 6 km buffer was created on the elephant routes and the forest area.

The block boundaries of the state were also digitized so as to identify the blocks through which the corridor was established.

These buffers were intersected to find out the conflicting areas of the three themes namely elephant routes, rail and road network, which were to be avoided during the corridor planning.

While planning the corridor, care was taken to follow the existing elephant routes to the maximum extent and to incorporate the forested paths and water bodies in the routes.

### **Key Conservation problems and issues**

- 1. Mines and mining**
- 2. Tribal hunts**
- 3. Starving of elephants**
- 4. Man- elephant conflict**

### **Collection, processing, and marketing of MFPs:**

1. Lack of collectors' organisation to guide and protect their interests. The purchasers of the MFPs operate on large-scale and used to purchase on spot. Under these circumstances collectors were being exploited.
2. Tribals are very poor and they lack required amount of capital for value addition.
3. The collectors of MFPs are ignorant about the benefits of value addition.
4. No systematic grading and standardisation is being practiced by the collectors. Thus, they get less price of MFPs .
5. Lack of infra-structural facilities, which affect the prospect of value addition of MFPs at tribal households level.
6. Due to illiteracy, poverty and ignorance, tribals are being deceived by the purchasers. They don't know standard weight and measurement and currency system.
7. Extremism is on high pitch in some pockets of the study area. It hampers the collection, processing and marketing (value addition) works of the MFPs due to involvement of their people in extortion (Rangdari Tax).
8. Large-scale deforestation hampers the prospects of collection and value addition of MFPs .

9. Malpractice is involved in the entire process of marketing and procurement of MFPs.
10. Delayed payment of collected MFPs to the poor tribals shifts them for other spot payment business.
11. The sample households receive low rate of collected MFPs as they are not being permitted to sell their nationalised collected items to private parties at higher prices.
12. Annual and seasonal fluctuation in production of MFPs compelled collectors to migrate to some other place in search of job.
13. The collector do not have technological know-how for processing and value addition at their own level.
14. Poor co-operative (LAMPS) operation in tribal villages also damaged the processing and marketing of the produce.
15. The attack of insects and pests affect the productivity of MFPs , ultimately affects the collections and addition.
16. Due to poor extension services collector are not motivated for value addition in MFPs.
17. Lack of regulated market at the beat/village level, which hampers the collection/procurement of MFPs.

### **Weeds:**

The spread of *Parthenium histophorus* (**Gajar Ghass**) throughout the state is a major problem of causing loss in biodiversity. It competes the agricultural and indigenous flora. The problem probably started since the severe draught in the state in 1970s. The plant is even not liked by the cattle and its roots secrete chemicals that is harmful for the fertility of the soil. A single plant produces 45,000 seeds four times a year and it should be destroyed on priority before flowering. Lantana is another problem in the forests of Jharkhand.

### **Industries:**

The network of industries and mining is spreading all over the state without maintaining the pollution control measures causing a threat to the biodiversity and the local inhabitants.

### **Criminal Activities:**

The **extremists** activities in Jharkhand are a great threat to the voluntary workers, researchers as well as to the govt. officials hamper the development and survey work in

the state. Not only the thick forested areas but the areas like Jhajha, Sono, Chakai, Simultala, Chakia and Batia are also infested with Criminal activities.

THREAT TO GANGA is similar to the state of Bihar, where about 500 km. Stretch of river Ganga lies.

**The factors causing decline in aquatic biodiversity are same as that of Bihar.**

### **Agriculture:**

1.6 m. topsoil is required for plant life. In undulating terrain the water current with more than a speed of 2 meters per hour causes soil erosion. This soil erosion becomes responsible to reduce the number of trees. Less number of trees sweeps the soil and sand that leads to the loss in agriculture, chocking of canals etc. The embankments are suggested to check soil erosion and increase water-holding capacity of the soil.

Dr. Deepak Sarkar, Principal scientist and head of NBSS & LUP (National Bureau of Soil Sciences & Land Use Planning) says man is just 15 cm. Away from the disaster if the 15-cm. Top layer of the soil is not managed in Chhottanagpur. Soil erosion is responsible for this threat. 45% of soil erosion takes place due to water. The undulating terrain and low water holding capacity in Chhottanagpur is the key problem. The top layer of soil containing nutrients and other preservatives is washed away by rainwater. Wind and chemicals are the other main factors responsible for soil erosion. The soil of the area is rich in acidic content and alluvial and laterite in composition thus does not hold water. There are 55 varieties of soil in Chhottanagpur needs different management plans.

### **Practical problems of the farmers:**

1. Scarcity of improved seeds.
2. Lack of technical knowledge regarding seeds, methods of cultivation, implements, insects & pesticides, plant disease etc.
3. Lack of cold storages.
4. Lack of proper marketing facilities for flowers and medicinal plants specially.
5. Lack of banking facilities, agricultural loans
6. Lack of irrigation facilities
7. Lack of communication & transportation etc.
8. Higher input cost
9. Low output

10. Unavailability of fertilizers at the time of sowing specially phosphate, potash and nitrogen.
11. Problem of middle man
12. Jute and silk industries have been failed for political reasons.
13. Fire for Mahua collection and other factors involved have destroyed the grasslands and thus affecting the Sheep farming.
14. Crop rotation technique is not properly used by the farmers due to lack of knowledge.
15. Only Central Govt. schemes seems to be functioning in the state like Maromod otherwise the whole system is almost non functional practically.
16. The marketing board and FCI has gone in the hands of the middlemen depriving the farmers from getting appropriate return of their crops.
17. **Dairy** involves high cost to start with. So, it becomes a difficult task for the milk producers.
18. Less attention is being given to Pulses cultivation.

### **Pest Management:**

Non-availability of pesticides at proper time, unavailability of bio-control agents are the problems faced by the farmers. They are also not well educated about the judicious use of the pesticides. Many farmers are rightly of the opinion that the pesticides use had direct effect on labourers, human beings and food crops as these were found in close contact with them. However, they did not perceive any effect of pesticides use as pollution of water, air, and animal.

### **14.ISSUES:**

#### **Stray (?) Animals:**

Few of the incidences mentioned are:

1. 4 elephants killed in train accident in Barwadih (Chhipadohar – Hehegarha ) railway line in July 2003. the 60 km. long railway line crosses throughout the forest. Also the negligence of railway employees was held responsible for it.
2. A herd of elephants damaging human life, their crops and houses in Dumka in July 2002.
3. 12 elephants in Amrapara in Pakur district creating havoc in Sept. and Oct. 2002.
4. A rogue tusker killed at Gumla (Sept'03). It had killed 7 persons in Simdega, 10 in Gumla and destroyed large amount of food stores and th houses of the villagers.
5. The elephants have strayed in Giddhaur (Chtra ) and creating havoc. (Marc 2002)
6. The other places of such incidences are at West Singhbhum, Sahabganj and Ranchi. At Ranchi just about a month ago the elephants had entered in the township.
7. About three years ago an elephant had destroyed the elephant had started attacking the permanent buildings of the officials was ultimately killed in

- Lohardagga area of Palamu forest instead of tranquilizing it and captured.. Till it was damaging the lives and properties of the villagers, no one was attentive.
8. A tusker had been migrated to Chhatisgarh and after that a joint meeting of the forest officials was held from the states of Orissa, Jharkhand, Bihar, Madhya Pradesh and Chhatisgarh in Feb. 2002

### **Two elephants deaths in Palamu Tiger reserve:**

First elephant (female) – external injuries caused by poachers, in the month of April

Second Elephant (female)- Anthrax was the cause of death, Ramdag Block, April 14. (Protected Area Update).

### **50 Elephants reported missing in the last two years:**

Reasons—1. Some mysterious disease 2. Poachers 3. Retaliatory killings by villagers where rampaging elephants have caused damage to life and property. (Source: Nityanand Shukla- Jharkhand's Jumbo mystery- Pioneer, 10/12/02, Protected Area Update)

**Trains killed nine ELEPHANTS in last three years in Jharkhand:** most of the killings take place in the Chaibasa Gua railway section of the Singhbhum District. (Source: Nityanand Shukla: ' Save Tusker Project Faces Elephantine Obstacles', The Pioneer, Protected Area Update)

**Kattha manufacturer threatens Palamu Radio Collars for TIGERS AND ELEPHANTS to track their movement:** The Jharkhand Forest Department has mooted a plan to fit radio collars on Tigers and Elephants in the state to monitor their movements, save them from poachers and prevent them from coming in contact with humans. The collars are to be first fitted on elephants in the Dumka and Pakur Districts where they have caused large scale damage to human settlements. Tiger too are to be radio-collared but this proposal is still in its initial stages. It is likely to be first tried with tigers in the Betla National Park. (source: Nityanand Shukla : ' Jharkhand out to protect its Wild Life' , The Pioneer, 26/07/03, Protected Area Update )

These are the few incidences highlighted but such occurrences are many fold more and not being reported.

The officials say, the elephants are attracted by Mahua collected by the villagers and the liquor made by them from Mahua. The elephants become addict of it.

The above-mentioned incidents have been noticed in the states of Bihar and Jharkhand but there could be many more such incidences of straying of animals invading in to the human habitation unnoticed.

### **Land Grab campaign:**

**Saranda** in West Singhbhum is known to be the best Sal forest in Asia. But at present the forest being the worst victim of deforestation as a direct result of tribal people for self-determination. Thousands of fell trees one can see inside the forest. A planned encroachment is going on in the forestland. First the encroachers girdle the trees by making slit in the tree bark. Gradually the trees die and then the people encroach on the forestland when they are taken off. This has raised a dispute. The tribals are demanding their 'Rightful Claim' of Land, Water and Forest and the forest officials call it a 'Land Grab Campaign'. Out of 85,000 ha area of reserve forest, 7000 acres between 1978 to 2000. number of villages have come out with full of cultivation in such area. The sources of forest dept. say that after the separation of Jharkhand state from Bihar, the 'Land Grab Campaign' has somewhat come to a halt. Essentially a Sal forest with some Teak plantation, Saranda has a rich collection of about 60 main tree species, 150 elephants other than tigers, leopards, Giant squirrels etc. harbour in this forest.

Iron ore exploration is continued in the forest area by the Steel Authority of India and very poor reclamation and plantation is being undertaken by them. Miners have joined hands with the land grabbers and have settled inside the forest. A couple of years back four persons belonging to a group of 600 timber smugglers have been arrested. The forest dept. and the police is facing some legal problems to deal with them as many of them belong to the adjoining states. Their connections with politicians, smugglers, extremists, mafia together creating problems in handling them.

### **Nuclear power plant at Jaduguda: A Major threat to biodiversity**

The Government of India has agreed to Jharkhand's proposal to set up a minor nuclear power plant in the state at an estimated cost of Rs 5 billion (US\$ 108 million). Jaduguda in the East Singhbhum district of Jharkhand was the most likely site and construction will take

six

years.

The Union government has directed the state to identify at least five sites suitable for the proposed project. The Atomic Energy Commission (AEC) would evaluate the list of sites submitted by the state. Details on cost and capacity of the project were yet to be decided and would be finalised only after consultation with AEC. (Business Standard, New Delhi, July 9, 2003)

#### **Committee finds no problems in Jaduguda**

The committee, headed by mines and geology director T. Devendranath, surveyed the environmental impact of the Jaduguda mine on the local residents and submitted a report to

the

government.

According to sources, the committee comprising representatives of pollution control board, industries wing and a retired atomic energy expert, noted that radioactive radiations were less than the permissible limits in Jaduguda. It also found that economic activity got a boost in Jaduguda after the UCIL set up the plant in the area. (Times of India May 22, 2003)

## **Supreme Court admits petition on Jaduguda uranium mine pollution**

On Sep 4, 2000, the Indian Supreme Court admitted a petition seeking direction to the Center and the Uranium Corporation Limited (UCIL) to take stringent measures at the Jaduguda Uranium Mines in Jharkhand in the wake of alarming reports that villagers were affected by the radiation from mines. (The Hindu, Sep 5, 2000)

## **Citizen group calls for health study and remedial action**

During a press conference held on April 5, 2000, the **Jharkhand's Organisation Against Radiation** (J.O.A.R) presented the following demands to the Government of India (main points only):

1. A multi-disciplinary team comprising of Medical personal, Radiologist, Ecologist, Sociologist, Chemist, Biologist etc from independent institutions i.e. All India Institute of Medical Science AIIMS New Delhi, should be constituted to look into the impact of the uranium mining operations (low-level radiation) on the environmental, health, safety and socio-economy of Jaduguda area.
2. The import of radioactive waste/material and radio-medical waste into Jaduguda for dumping/storage or in the guise of recycling or further extraction should be STOPPED IMMEDIATELY.
3. All the villages around the already existing tailing dams/ponds should be immediately evacuated to a safer place until proper and permanent rehabilitation is done.
4. The DAE, BARC and UCIL should set up a full fledged Medical Center in or around Jaduguda with medical personnel qualified to treat low level radiation related diseases, its function should be supervised by AIIMS.
5. The Atomic Energy Regulatory Board AERB, should be made autonomous from the Department of Atomic Energy, according to International norms.

## **Supreme Court issues notice on Jaduguda uranium mine pollution**

On Aug 30, 1999, the Indian Supreme Court issued notice to the Union Government and three others on a public interest petition seeking a direction to take immediate steps to insulate people living in the vicinity of the Jaduguda uranium mine in Jharkhand from the hazards of untreated effluents and pollution of uranium mining.

The other respondents to whom notices were issued were the Uranium Corporation Of India; the Atomic Energy Commission and the Deputy Commissioner, Singhbhum district, Jharkhand. (The Hindu, Indian Express, Aug 31, 1999)

## **Tribals:**

One crore of tribal population in India including Bihar and Jharkhand is facing a similar type of problem from the forest dept. They are being prohibited for continuing their agricultural practices on forestland in the name of developing the under plantation. The National Forest Policy 1998 recommends that the tribals and forests are interdependent. The tribals are solely depending upon the forests and no other option is available for them. A suggestion is sought to define the ownership of their land and they should be encouraged for plantation and their protection. They should be given the ownership of the trees and maintaining the balance of extraction and regeneration of the forests. In American ideology, forests are believed to be the non-habitant areas but in India the situation is little different. If they have tried to be pushed out of the forest, they come in resentment.

Recently this year the central govt. has announced to lease the land to the tribals and to convert forest villages in to the revenue villages in a few states like M.P. and Chhatisgarh.

Various developmental **projects** like Koel Karo Hydel project, Kutku Dam project and Paras Dam project initiated in the region by the government raise the issues of inundation of the reservoir and displacement of the tribal people.

‘**Kol**’ tribes are included as scheduled tribes in U.P. and Madhya Pradesh but not in Jharkhand. These tribes are spread in Deoghar in Jharkhand and Kaimur in Bihar and some other districts. This is going to be an issue before the states. (Mar’02)

‘**Jhoom**’ (**Shifting**) **Cultivation:** is a major problem in Jharkhand not only responsible for degrading the forestland but it also affects the wildlife to a great extent. But this practice is a part of the tribal people and tough to stop at once.

## **TRIBAL HUNT**

**The tribal hunt** is organized every year on Baisakhi Purnima for one day. In this whatever is found by the tribal groups small or big is killed. This disturbs the whole forest and its wildlife and the loss caused in one day is hardly recoverable for many years. But then, this is the tradition.

## **IMPACT OF CHRISTIANITY ON THE TRIBES OF JHARKHAND**

At present Jharkhand has a complex social condition providing unique opportunity to the various socio-religious and anthropological groups.

Advent of Christianity in Jharkhand dates back to 1845, when the first four Christian Missionaries from Germany established the Gossner Evangelical Lutheran Church in Ranchi, the capital of Jharkhand. Gradually, the Churches of other denominations like Anglicans and Roman Catholic established their foothold in this region (Hundred years of

Christianity in Chottanagpur by Saraju Mahto). These missionaries under the patronage of British colonial power gradually and steadily launched a cultural invasion on racially different tribes. They successfully used religion as a mechanism to expand the hegemony of church among the 'indigenous' people of the area. They were caring only for those who changed their socio-religious loyalty from SARANA (Sacred groves as place of worship by the local tribes) to GIRJA (Church).

At the initial stage there was a revolt by Birsa Munda (1890-1895) popularly known, as Birsa Bhagwan among the tribal people of Jharkhand was an anti-Christian missionary movement, which was later projected as part of National Freedom Movement. (Dust Storm and Hanging Mist by Kumar Suresh Singh, IAS)

After establishing their foothold in the region Christian missionaries gradually monopolized the education and health and alienated the tribes through allurements and some philanthropic and social activities to accept the cultural tradition of the west at the cost of forgetting their respective socio-cultural tradition. The change in the culture, Community ownership of land and forest, which was the traditional means for subsistence, was lost due to their commercialization and barter economy was replaced by the market economy. Practice of making social decision on the basis of consensus, which was a form of tribal democracy, was replaced by the concept of democracy. It may be worthwhile to mention that almost all the leaders of Jharkhand party, which emerged as a political outfit of the tribals in 1949, were Christians. The forces of Hindutva launched an aggressive campaign against the Christian missionaries. The Tribals of Jharkhand are now passing through a serious transition both socially and politically. This is the reality of the ongoing problem in Jharkhand State and the Center needs to pay more attention to the current conflict.

### **JHARKHAND PRADOX**

Displacement of Tribals due to large-scale mining and industrialization.

<b>BIG PROJECTS</b>	<b>DISPLACEMENT</b>
TISCO	Tribals of four villages
HEC	12,990 families, 25 villages
Bokaro Steel Plant	12,487 families, 46 villages
<b>Estimated Displacement due to -</b>	
Suwarnarekha Project & Koel karo project	60 thousand tribals
Palamu firing range	5 thousand tribals

### **BIOLOGICAL MONITORING OF RIVER SUBERNRAKHA**

The river Subernrekha, which is a natural basin of large number of plants and animals, originates near Lodma-Piska road, two miles south of Nagri village (Ranchi District) in the form of artesian well and traverses a distance of 393kms. crossing three

states – Jharkhand, Orissa and W. Bengal and finally meets the bay of Bengal in Midnapur district of West Bengal. The river at Ghatshila is one of the most polluted zones since it acts as a mother dust basin for the Hindustan Copper Limited and Uranium Corporation of India Limited, which affected the biodiversity in that zone.

Algae and phytoplankton play a key role in the productivity and constitute the base food chain in aquatic ecosystem encouraging in all kinds of habitat. In all 59 members of Chlerophyceae, Bacillariophyceae and Cyanophyceae were identified in river Subernrekha. Out of 59 members identified, 25 were from Chlerophyceae, 14 from Cyanophyceae and 20 from Bacillariophyceae. The population density as well as species diversity indices were comparatively reduced in three selected sites at Ghatshila than other sites of the river studied. Among three sites at Ghatsila, Dahigron was the most polluted zone where the effluents were used to discharge showed less population density and species diversity indices. Zooplanktons are the integral part of the biotic community and contribute significantly to the biological productivity of the fresh water ecosystem. 32 members of Protozoa, Rotifera, Cladocera and Copepods were identified at different sites of river Subernrekha. Out of 32, 10 were from Protozoa, 13 from Rotifera, 5 from Cladocera and 4 from Copepoda. The zooplankton density and species diversity indices were also minimum at Dahigora. The reduced phyto and zooplankton density ultimately affected the aquatic ecosystem of river Subernrekha at Ghatshila resulting in less number of species and population of different aquatic insects and fishes, which ultimately affected the biodiversity.

Though we have paid considerable attention to the factors responsible for diminishing the biodiversity yet the concrete steps to conserve the biodiversity have yet been undertaken by various Govt. and NGO set up. Ecosystem security and restoration of degraded habitats should be given top priority. Perhaps the best strategy would be to concentrate upon maintaining the phytodiversity because animals and microbes are totally dependent upon green plants.

### **Straying incidences of animals:**

Since last 5-6 years the herd of about 14 **elephants** every year is appearing in the district of Banka (Bihar) and near the township itself, which is a densely populous area. It is roaming in Chandan, Katoria and other places in the district. An elephant was killed by electric wires and seeing the crowd around them others loses their nerves have damaged many human life and property.

It is surprising to note that in the densely populated areas of Jagdishpur, Rajaun and Amarapur in Bihar, where there is no suitable habitat of **tigers, during last about a decade three tigers have been killed**. One each in the year 1990 (Jagdishpur just about 15 km. from Bhagalpur city), 2001 (Subhka, Rajaun about 27 km. from Bhagalpur city) and 2002 (Amarpur about 25 km. from Bhagalpur city). These areas are lying south to Bhagalpur and all these incidences took place in the month of January.

The above incidences in Bihar are probably the results of degrading habitat and disturbances in their habitat in Jharkhand, which is the suitable habitat for these large

animals. Here it becomes an inter-state issue to control over such incidences and loss of biodiversity.

**Elephants in Jharkhand:** When the pattern of land-use by people changes and forests are fragmented, the elephants' habitat is dissected and elephant populations become isolated in small pockets. Loss of forest contiguity also destroys their traditional migration routes. As a result, elephants cause considerable damage and distress to local communities, including loss of life.

**Industries:**

Thermal power generation will impact biodiversity of the state as well as adjoining areas adversely. It poses a bigger risk to biodiversity than all other anthropogenic interferences put together have done so far.

**15.EFFORTS:**

**Institution Involved in Processing and Marketing of MFPs.**

FDC was the sole processing and marketing agent of nationalised items like kendu leaf, sal, mahua, myrobalans karanj seed (de-nationalised 1994) etc., TCDC was marketing of items like kendu non- nationalised MFPs. Moreover, Ayurvedic and Medicine companies were engaged in processing and marketing of medicinal herbs with the support given by the government. Moreover, no government agency was found engaged in promoting value addition of MFPs at the tribal areas.

**Programmes of Value Addition**

In order to initiate the marketing, research and development efforts to ensure better prices for the tribal household and by releasing the fact that processing, grading and packaging of MFP items would get higher returns, the FDC has taken up processing of some important MFPs. The FDC, therefore, established Bihar solvent and Chemical Limited at Latehar in Palamu District for extracting Sal seed. Sal oil non-edible substance, but it is of much important in aeronautical oil, grease, chocolate making. Solvent unit started functioning in 1986 but after a few years, it also suffered loss and thereby stopped production. Likewise a factory of Karanj expeller was established at Khunti in Ranchi in 1989 but the seed of Karanj was de-nationalised in 1994 and thereby the unit stopped production. A tannin factory is working at Latehar in public sector but was reported running in heavy loss and is on the verge of closure. A polythene factory and a match factory are also working in heavy loss. All attempts taken by the government proved futile which ultimately resulted in closure. No substantive value addition is being done at the tribal household level.

**WORLD BANK SURVEY FOR FORESTRY PROJECT:**

World Bank (WB) teams were reported to have toured parts of Jharkhand in early February as part of the Jharkhand Forestry Project (JFP). One of three-member team

visited project areas that included Dalma Wild Life Sanctuary, Saranda Reserve Forest, Kolhan and Podahat. Two other teams simultaneously visited forest areas of Hazaribagh and Palamu districts. The main aim of WB mission was to thrash out project details, and both financial and capacity building aspects were considered. The preparatory phase comprising field study, drafting of the detailed project report, and estimated costs would take about two years and the implementation period of the project is expected to be around five years.

The project aims at facilitating greater public attention and participation in eco-management, generating employment for tribals, improving infrastructure and developing an effective mechanism to achieve sustainable forest growth. (Source: World Bank team to survey forest, HT. 11/02/02)

### **Tribals:**

**Action Aid** is working in partnership with the Agrarian Assistance Association (AAA), a local organization working to organize and empower tribal peoples in Dumka district. AAA is **helping tribal farmers maximize their productivity through eco-friendly method**. Communities are also helped to identify and develop alternative sources of income such as **cottage industry based on forest products**. There is a **non-formal literacy programme** for children and a **sanitation and health awareness programme**.

### **Efforts by the forest Department:**

The development activities are undertaken through three types of funding patterns such as 100 % State scheme, 100 % Central scheme and 50 % Central schemes.

In erstwhile Bihar the Forest department used to get 3 to 4 crores for development works under Plan head. In the year 2000-01 the State sanctioned more than 10 crores in Plan head for the Work component. The budget under Plan head for the year 2001-02 is 73.00 crores .

The main Afforestation programme will be taken up along the National Highways and State Highways and in the second phase other roads will be taken up. This is the programme prioritized by the State Govt. to provide shelter to the travelers and simultaneously the subsistence level of the poor people can be increased through plantations of Fruit plants and Timber yielding plants. Altogether Rs. 26.00 crores has been allocated to the Forest Department under this head.

The next priority is to rehabilitate the Degraded Forests. Rs. 20.00 crores has been earmarked for this purpose. Since the tribal's life is entirely dependent on the productivity of the Forests, the Chief Minister has personally taken care of these programmes .

To meet the rural energy crisis quick growing fuel and fodder wood plantations is to be taken up in this financial year at a cost of Rs. 5 crores.

The Govt. of India will take up consolidated afforestation and ecological development in four districts of Ranchi, Giridih, Deoghar and Dumka through 100 % assistance.

For the Development of High quality seeds by using modern scientific techniques an amount of 31.44 lakhs will be spent this year by the Govt. of India.

For the scientific management of the natural bamboo forests and plantations of bamboos in such areas a scheme amounting to Rs. 1825.16 lakhs has been submitted to the Govt. of India.

**Corrective measures at Palamu:**

1. Fire watch towers with protection squads
2. NIC centers to promote tourism

**Efforts By Forest Department at Palamu:**

1. NIC for awareness
2. Help in research activities
3. Training for the staff
4. Eco development
5. Executing legal matters
6. Lantana eradication for maintenance of grasslands.
7. Water holes & dams
8. Salt lick

**Elephants:**

The overlay of the new elephant routes on the forested area shows that these intelligent creatures have been driven through the places where they could sense water bodies. The planned corridor is a 6 km buffered area keeping in mind that the daily movement of the herd is about 5 km .

Despite all efforts it was not possible to entirely to avoid the passage of rail and road routes through the corridor, but these intersection i.e. of the rail and the road with that of the planned corridor, has been taken through forested area rather than agricultural land. The planned corridor would enable the elephants to pass from one forest reserve into another, alternately to drive back the isolated herds into their original habitat by experts avoiding man-elephant conflict.

To discover details of the problem the States of Jharkhand and West Bengal, and help formulate a strategy, a field study is being undertaken in the west Singhbhum and east Singhbhum regions of Jharkhand, and in parts of southwest Bengal. The study will focus on elephants and humans, and their often-fatal interactions.

It will assess the elephant population size and the condition of their habitat. Next, it will document changes in land-use patterns by the people of the area. It will then quantify the number of people who have been killed by elephants and assess the loss to human property. As a result, we will get a clear map of existing elephant habitats, the movement of the elephants, and land use patterns.

Mr. Kisor Choudhuri, who has considerable expertise in this field, is carrying out the study in co-ordination with the Forest Departments of the States of Jharkhand and West

Bengal. Other members of the team are Dr. A. K. Malhotra, Mr. S. H. E. Kazmi, Mr. Krishna Prasad, Mr. Y. P. Yadav, Dr. Srikumar Chatterji and Mr. Gour Biswas.

### **SOLAR SHOCK FENCES TO REDUCE HUMAN- ELEPHANT CONFLICT**

Jharkhand Proposes to set up solar shock fences to keep elephants out of human habitations in a move to reduce human-elephant conflict in the state, especially in the districts of Dumka and Pakur and the outskirts of Ranchi. (Sources: Jharkhand proposes Solar shock fences to reduce human – Elephant conflict—07-10-02)

### **Bamboo Project:**

Name of the project	Bamboo Development
Name of the State	Jharkhand
Name of implementing agency	Forest & Environment Dept. Jharkhand
Name of the coordinating office	Chief Conservator of forest, Dev Jharkhand,Ranchi-2
Period of the project	2000-01 to 2010-11
Project Location	Forests of plateau region of 18 district Jharkhand mainly i n the southern part & taking up some private lands also
Total Geographical area of the project	23,605 sq km.
Total Project area	15,300 hac.
Total degraded area within the project	7500 hac.
Total area to be treated during the project.	(T.S.P) 7750 hac (O.A.) 7550 hac.
Ownership of the treatable land	Forest Land
Total estimated cost of the project at current wage rate	Rs. 18,25.16 Lakh
Area of project in which Silvicultural operation is required	7500 hac.
Area of project to be taken up for plantation	7800 hac.
Total population to be benefited	10.00 lakhs
Man-days to be generated during project period.	38.50 lakhs
No. of Forest Division involved in the	21

implementation of the Project	
Name or important species to be planed in the project area	Dendrocalamus strictus, Dendrocalamus longispathus, Bambusa arundinacea, Bambusa gigantea
Rights & Concession & enjoyed by	Villagers are allowed to collect villagers on protected forestland. Fire wood, house- building materials for their bonafide use. Also free collection of NTFP& free grazing except in current regeneration area are allowed. Tureen are allowed to take bamboos for basket making.
Maintenance of assets of project period	By concerned VFMPC.
Strategy for development	The bamboo 7-cane development project will be a need-based programme that would be implemented in consultation with the local VFMPC.
Scheme of Implementation	The local VFMPC will be associated in the field – work including identification of forest dependent persons & giving them employment in the project
Benefit sharing-	Whenever applicable the sharing arrangement between the participating villagers & the F.D. will be done.
Monitoring & Evaluation	Monitoring & evaluation will be done by the concerned D.F.O.s
Research	Improved planting stock in the form of quality seeds & culms obtained from genetical plus trees and improved nursery practice will be done by Research & Evaluation Division, Ranchi. & F.R.O.Ranchi. Date of Proposal 15 <sup>th</sup> December, 2000

### **Jharkhand Forestry Project**

For the forestry sector in the new State of Jharkhand a project of Rs. 1147.77 crores to be spent over a period of 10 years to be funded by the World Bank has been sent to the GOI. The main components of this project are:

- i. Rehabilitation of degraded forests over 5 lakhs hectares
- ii. Afforestation on private land through peoples participation in 40,000 ha
- iii. Linear plantation over 1800 km along roadside, railway line and canal banks

- iv. Biodiversity conservation
- v. Seed and nursery technique development
- vi. Technical upgradation of technique of working plans, monitoring, coordination, mapping, inventory, etc.

### **State Trading Organisation**

This is the wing of the Forest Department, which harvests and does marketing of the major forest produces of the State. Under one CCF there are three ST circles and 18 Divisions looking after the logging and marketing of the timber, bamboo, khair etc.

### **Forest Fire Control**

The State Govt. is quite serious in protecting the forest from the fires. Govt. of India has been requested to fund this project for creation of related assets so that adequate measures can be taken up for fire control.

### **FOREST DEVELOPMENT AGENCY**

FDA has been created in the State of Jharkhand. All the funds available for plantations should be routed through the proposed FDAs to ensure timely utilization.

The highlights of the proposal for FDA are as below:

1. All territorial divisions would be included under this scheme.
2. Committees should be formulated in each Division
3. Each Forest Division will be the plan unit of the FDA.
4. All village Forest Management and Protection Committees will remain under the control of the FDA.
5. The Conservator of Forests, Territorial Circle will be the Chairman of the FDA.
6. The Divisional Forest Officer shall be the member – secretary cum Chief Executive Officer Of The FDA.
7. The Chairman of all the VFMPCs will be the member of the FDA.
8. All FDAs would be registered under the Registration Act.
9. All funds under the centrally sponsored schemes would be routed through the FDAs to the VFMPCs. and other implementing units.
10. Forest Department shall be the nodal department. Other Govt. Departments working under such schemes would have to formulate and place their schemes for approval to the concerned Regional Chief Conservator of Forest. After getting sanction from the RCCF money would be released by the FDA.
11. FDA will be responsible for administration and monitoring of the schemes.

**Joint Forest Management:**

The progress of JFM programme in Jharkhand division wise is given below (as on 31 December, 1997)

**PROGRESS OF JFM in JHARKHAND**

<b>DIVISION NAME</b>	<b>TOTAL FOREST AREA</b>	<b>PROTECTED FOREST AREA</b>	<b>VFPMC NO.</b>	<b>PFS UNDER JFM AREA</b>
Hazaribagh West Division	169231	169237	77	33234
Hazaribagh East Division	179339	120950	195	48347
Chatra South Division	101892	101892	24	27200
Chatra North Division	93497	93497	16	14082
Koderma Division	88978	73897	44	17924
Giridih Division	142586	138953	44	23691
Dhanbad Division	28380	10928	36	3177
Latehar Division	130953	109737	72	36357
Daltonganj North Division	134626	130078	23	22590
Garwha North Division	78568	78560	91	46852
Garwha South Division	124514	123960	66	672138
Gumla Division	127392	12436	150	43364
Ranchi West Division	218862	115132	45	12835
Ranchi East	-	-	-	-
Lohardaga	91924	64257	99	23082
	85654	3989	9	3504
	68932	10486	13	602
	-	15632	15	5140
	65923	53051	43	2314

Division	49149	49118	34	25342
Saranda Division'	90096	40608	100	9628
Kolhan Division	31400	31400	124	55628
Porahat Division	135999	103322	18	3233
Chaibasa North Division	42036	39062	48	17985
Chaibasa South Division	68190	42440	9	5812
Dhalbhum Division	64069	35812	32	6960
Dumka Division	12797	12746	50	1718
Deoghar Division	179762	178563	149	102254

## **Effort by Industry:**

### **Noamundi:**

The two examples in Bihar and Jharkhand one each by the industries showing deep interest in regenerating and protecting the biodiversity despite of running non friendly environmental style of commerce.

In 1901 Jamshedji Tata had been given allotment of certain area where he could run iron-mining operation and would be cutting trees and replant them after finishing the mining operation. At Noamundi in West Singhbhum in Jharkhand iron is mined since 1925 by TISCO. The leased area was 202432 ha. they have reclaimed 240 ha mined land and planted 1.8 million saplings with 90% survival. The other pollution control measures taken were:

1. This is the earliest mining area to setup one efficient slim dam in the country to control water pollution.
2. Dust suppression in crushing and screening plants, drilling exhaust and water jet system has been installed.
3. Reuse of slim dam water.
4. Minimize air pollution even mining 5 million tones of iron annually.

Dorabji Tata Botanical Park at Noamundi spread in 45 acres of land sets a standard as how a mined out area can be turned so green and life can out of the stones too. Varieties of plants including beautiful roses have been raised here. Keonjhar, the bordering area of Singhbhum in Orissa has really developed wondering green is another example how the mines can be turned in to green.

There is another example of saving the forest at Noamundi in Vishiya village where the forest had degraded and the tribals were struggling for their livelihood, a Save forest

Movement started in 1988. Now the movement has a regular committee of 42 villages. Some rules have been fixed to save forest with a provision to punish who violates the norms. The group of about 50-60 villages is led by Mr. Shambhu Charan Kerayee who initiated the movement supported by TSRDC (Tata Steel Rural Development Society). 5000 acre of forest has been regenerated in the area. In Noamundi block 70% population from 67 villages mainly of Ho tribal community are traditionally linked with forest for their survival. The area is consisting of Sal, Gambhar, Mahua, Arjuna, Kendu and Aasan trees mainly. The villagers every Sunday clean the bushes to support the trees growing. Today there is the fuel wood and trees for their consumption. The tribals sell Sal seeds and other forest produces for their livelihood in the market. TSRDC supports them in Social Forestry, regeneration of forest and raising saplings for sale. The central committee comprises of Mundas or the chief of the villages. The villagers are allowed to cut some trees for fuel and upto 30 trees are allowed to cut for building their houses. The punishment for violating the rules is 15 kg. of rice and R. 10 to 500. if this fine is not paid by them their property is auctioned to recover the amount. On 6<sup>th</sup> of January 2002, 57 Sal trees were found felled in Sitakia village. The offenders were traced and charged the fine. The timber mafias are active in the surrounding area and the efforts by govt. agencies are in file only. This is one of the best examples of SUSTAINABLE DEVELOPMENT.

### **Flora:**

1. Germination studies of some rare and interesting plants collected from Rajmahal hills have been made. Of the 60 species included in the study, seeds of 38 species germinated.
2. Efforts have been made to conserve rare and threatened plant in the Botanical garden of the TM Bhagalpur University, Bhagalpur. Plant species viz., *Rauvolfia serpentina*, *Withania somnifera*, *Semecarpus anacardium*, *Zingiber roseum*, *Helicteres isora*, *Gymnemma sylvestre*, *Mucuna nigricans*, *M. pruriens*, *Momordica dioica*, *Leea indica*, *Coffea benghalensis*, *Sterculia urens*, *Costus speciosus*, introduced in the Botanical Garden, are thriving well.
3. Efforts are being made for large-scale propagation of some rare and threatened plants. A large number of plants of *Rauvolfia serpentina*, *Withania somnifera*, and *Sterculia urens* have been raised from seeds.
4. The tribals religiously conserve the plant diversity by maintaining sacred groves in and around their areas. Some of the important plant species include *Terminalia alata* (asan), *Ventilago madaeraspatana* ( Bonga Sarjom), *Semecarpus anacardium* (Bhelwa).

### **Efforts by Non Govt. Agencies and others:**

#### **Plant Fossils:**

The above account indicates the importance of this area. If the precious gift of nature is getting destroyed, it does need “conservation”. The project was undertaken, with the support of WWF- India and **Mandar nature club**, Bhagalpur is- **“CONSERVATION OF RARE PLANT FOSSILS: A HIDDEN TREASURE IN RAJMAHAL HILLS “**.

**NEAC** (National Environmental Awareness Campaign) by the ministry of govt. of India seemed to be effective in generating interest and support to the NGOs in the state and the govt. is getting excellent support instead with investing smaller funds distributed for wider coverage.

**BNHS** has spread a network in the state through its direct members and through the Indian Bird Conservation Network programmes. It is conducting so many activities in the state like Bird banding Camps etc. and providing advisory and consultancy when needed.

**SACON** also involves the people and supports for participating in the national activities.

Most of the NGOs are development oriented now a day. **Nature Conservation Society** at Daltonganj under the leadership of Dr. D. S. Srivastava is engaged in documentation, research, awareness on biodiversity and also economic empowerment of local communities to minimize dependency on forests. It has formed a network with other local NGOs for such activities. NCS is also using student communities in documentation and preparation of people's biodiversity Register.

**INTACH** (Indian National Trust for Art & Cultural Heritage) at Hazaribagh under the leadership of Sri Bulu Imam is an exceptional NGO working to conserve the heritage and biodiversity of the state.

A few well-known organizations are active such as Pani Chetna Manch and others.

**Mandar Nature Club (MNC), Bhagalpur** one of the best environmental NGO known in the state of Bihar and Jharkhand was established in the year 1990. It started the activities with children education and public awareness through many activities including plantation programmes, entered in to serious environmental activities by raising movement against issues, mass mobilization, study, survey and publication particularly in the field of protected area development, coordinating with organizations at national level and spreading a network within the state and developing its own library to help workers in the field of environment. It has the credit of reviving the study of ornithology in the states, discovery of animal fossils, protection of plant fossils, participating in national and international events for highlighting the issues of the states and supporting govt. agencies and organizations in carrying out their biodiversity conservation programmes.

#### **Efforts related with Birds:**

The many natural habitats having good potentiality for birds have been recommended by Arvind Mishra, Mandar nature Club and the State Coordinator, Bihar & Jharkhand of Indian Bird Conservation Network (IBCN) for the inclusion in the list of **Important Bird Areas (IBAs)** of Asia being prepared (for India) by BNHS. 4 sites of Jharkhand the

Palamu Tiger Reserve, Hazaribagh National Park and North Karanpura Valley, Udhuwa Lake Bird Sanctuary Chand Shahar Lake.

## **16. GAP:**

### **Prospects of Value Addition of Forest Produce**

Forests are an important adjunct to tribal culture and economy. The socio-economic life of the tribal is intimately interrelated, intermingled and intertwined with the forests. The life and economy of the tribal is mainly based on natural resources comprising of primitive methods of agriculture and collection of forest produce. Tribals living in and around forest cannot insure sustenance on agriculture throughout the year, they usually make a living out of the forest produce harvested and collected by them. Tribals in Jharkhand collect various items of minor forest produce (MFP) from the vast forest tracts in which they inhabit to supplement their meager income from agriculture.

Tribal area in the Chottanagpur and Santhal Pargana region are potentially rich in MFP items like kendu leaf, sal seed, mahua, kusum, karanj, palas, harra bahera, awala, mahua flower, neem, honey and wax, lac, gum, tamarind, etc. while a small proportion of mahua flower, honey, tamarind and grass is utilized by sample household for self-consumption. Most of the collected items of MFPs are sold either to the FDC, TCDC or to the private traders for cash to meet the household expenditure. It is the proper place to mention that the proportion of produce processed to add value to mention that the proportion of produce processed to add value is very small in number, while the major part of the MFPs is sold from tribals area s in raw form. Various MFPs like Kendu leaf, oil seeds like Sal seed, Karanj, Kusum, niger, mahua, palas, neem are sent out of tribal areas as such without conversion into oil. Lac, gum and resin in a very small quantity graded and treated before selling it. Even deseeding and defibreing of tamarind is not done of tribals' level to get substantive price. Plate making and bidi rolling is not practiced significantly on the tribal's level to get handsome benefit.

### **Product Profile of Important Minor Forest Produce:**

More than 100 varieties of MFPs were available in the forest tracts in Jharkhand. Out of which merely 14 MFPs items are considered to be most important and contribute a major proportion of income to tribal household. The product profile of these items indicates that Kendu leaf is the most important MFP item constituting about 50 percent of the total value of procurement made by FDC and TCDC jointly during 1997. It is traditionally being collected and sold in the Chottanagpur, Santhal Pargana.

Sal seed in another MFP item, constituting about 20 percent of the total value of MFPs purchased by FDC during 1997. The other important MFPs items available in the forest of Jharkhand are myrobalans, Karanj, tamarind, chirongi, gum, mehulan leaf, constituting about 20 percent of the total procurement. Honey, Mahua seed and flower are also predominantly available in the region. Niger seed, tasar cocoon, Karanj seed are available in the Ranchi, Daltonganj and Hazaribagh Divisions in considerable proportion.

The report is being prepared under high constraints of time and resources within a period of one month's time practically. The data collection has been done hastily. The study reports could not be explored from all the corner of the state.

There is a gap in the vision of the decision makers as regards the protection and development of biodiversity of the state.

The greater part of the state is unexplored and data deficient for every field of biodiversity.

The data available are either too old or are the results of unskilled survey.

The interdepartmental cooperation within the govt. is another problem in conducting any multidisciplinary programmes smoothly.

Many individuals and institutions could not be contacted due to paucity of time and resources.

Many information are scattered in small pockets and could not be collected.

There is a gap in inter departmental and inter organizational cooperation that affects the study and collection of various data from the field.

**Flora:**

1. There is need for publication of flora of Jharkhand. Although some district floras (Ranchi, Palamu, Hazaribagh) have been published but a comprehensive study on the flora of the entire State is needed.
2. Forest flora of Chottanagpur (including Santhal Pargana) published by H.H. Haines (1910) needs revision. This will provide a clear picture of present status of the forest flora.
3. There is need to study impact of human activities on the flora of Jharkhand especially in the areas where extensive mining is being done.
4. Although expertise is available but there is no proper funding for floristic study of the State.

**PTR:**

There is a gap in policy and structure in the management practices. We are monitoring PTR since 1976. The forests recouped and animals increased till 1985. The decline effected after that but slowly. The recent years have produced no management/on paper management. Now a day instead of field management, records are maintained only. The lack of attitude, village antagonism, non transparency in functioning, overaged or less field staff, non movement of officers and field staff in the forests, stoppage of patrolling and anti poaching operations are few gaps.

## **17. SUGGESTIONS:**

### **GAPS AND SUGGESTION**

Geographically major portion of Jharkhand includes, Chottanagpur highlands extending from Rajmahal hills to Netarhat and adjoining flat top plateaus in west and hills of northern fringe of plateau to southern Saranda forest region of Singhbhum other than the a stretch of river Ganga involving some wetlands. The greater part of the state is unexplored and data deficient for birds and their habitat.

It is high time to undertake a comprehensive survey of the status of complete biodiversity.

It is difficult to define the status of biodiversity based on few popular sites only as it has been in practice. If the proposed work is undertaken seriously by involving NGOs, local people and govt. dept. and institutions, then the outcome will produce a baseline data on which detailed study can be initiated in future.

#### **Wildlife:**

The only bird sanctuary "Udhwa", only wolf sanctuary Mahuadanr and Elephant sanctuary Dalma with its elephant reserve areas need studies on movement pattern, man-animal conflicts, threats like mining etc. and restoration action plan should be prepared.

### **Action Plan Recommendations for Elephants:**

Priorities for elephant conservation in this region include liking and maintaining habitat contiguity through effective protection, removal of illegal settlements and creating conservation corridors, controlling and curbing tribal hunts, relocation of a few small settlements to other developed areas, habitat improvement through enriched plantations, minimizing man-elephant conflicts through tactical methods of erecting barriers, developing better monitoring and control on mining pollution activities, developing a better land use planning and co –ordination and eliciting peoples participation for various programmes and activities etc. The zone wise recommendations are given below:

#### **Zone J<sup>1</sup> :**

- a. Priority to be given for controlling crop depredation and manslaughter in the Betla and adjoining areas. Effective barriers to deter the elephants from depredation to be taken up.
- b. Research on man-elephant conflict investigation and mitigation to be initiated.
- c. Well- distributed water management plans for dry spell to be executed.

**Zone J<sup>2</sup> :**

- a. There is need for protecting and maintaining the corridor between Saranda Forest Divi. on the south to the forest of Bonai in Orissa, to Porahat, Kolhan and Chaibasa South forest Divi.
- b. The forest corridor between Porahat Forest Div. On the north to be protected and maintained linking the Chandil Forest of North Forest Div.

The mine and mining activities and their discharges in air, aquatic and terrestrial ecosystems to be monitored. For aquatic ecosystem monitoring TSS and Turbidity as key parameters to be done regularly. The provisions of Environmental Management plan as drawn by the sitting industries to be strictly followed up.

**Poaching** of tigers is prevailing in the state for smuggling not only the skin but also for its bones that is used in South Asian countries in making wines. Special care should be taken in the area of Palamu forest where the incidences are more and organized.

- (a) Despite the management plan of PTR, it is not functioning on proper line. People's Biodiversity Register should be made mandatory for conservation.
- (b) Average age of forest guards is 55 years and it is not expected from then to move in the field. The Officers are increasing but field staff is decreasing. The immediate recruitment of field staff is essential.
- (c) There is no attitude from officers and staff to project wild life. The trained staff should be posted.
- (d) The fear of extremists have made with drawl of staff to range head quarters. There should be separate forest protection force, which should not taken from Police.
- (e) The antipoaching activities should be initiated. The studies and documentation is needed on movement pattern, people's purview and preparation of PBR in PTR.

This concern necessitates the conservation of these plant fossils in the Rajmahal Hills and a proposed project is directed by **Mandar Nature Club**, Bhagalpur to conserve and preserve the natural habitat, i. e. by declaring the area concern as **NATIONAL FOSSIL PARK**.

All the forests of Jharkhand have become the domain of the extremists. But the district of **Sahabganj** is lucky in this regard and has a different habitat of riverine plain and wetlands. This area specifically can be developed easily without much hindrance. **Udhuwa Lake Bird Sanctuary**, the only Bird Sanctuary of Jharkhand can easily be developed as an excellent eco tourist spot along with it a **National Fossils Park** for Plant Fossils and a **Dolphin Sanctuary** can be developed in this district that is much **less affected by extremists**. The other places of interest in the district are the **historical monuments** of Mughal period and some **natural hill streams** etc.

We may not give up or change their beliefs and tradition of tribal hunt but instead they may be provided some goats, cocks and pet animals released in their area to perform the formality of '**Tribal Hunt**'.

## **Action Points**

Following are some **Action Point** including the bracketed names of the concerned departments/agencies suggested for improving the collection, marketing and value addition of MFPs:-

- Co-operative institutions should be revitalized for ensuring value addition at household level, so that the interests of collectors could be protected.
- Government should provide financial assistance to primary collectors for required MFPs processing equipment.
- The collector households should be encourage/ motivated for grading / processing of the collected MFPs. For this purpose the government extension agencies/ NGOs in the area should be involved.
- Proper infrastructural facilities should be provided in the forest area for encouragement of value addition and remunerative marketing of MFPs.
- Malpractice by middlemen/ private agents should be checked in the marketing of MFPs. For this purpose regulated market should be established in the forest areas of Jharkhand.
- Spot payment of purchased MFPs. Should be increased (in case of Sal seed it should not be less than Rs. 2.50 per kg. And for kendu leaf Rs 350/- per standard bag), so that collectors could get remunerative prices for collection of MFPs.
- The low cost technical know-how should be provided to primary collectors for value addition in MFPs by organising vocational trainings etc.
- Proper care of MFP trees should be insured, e.g., pruning & training of Kendu trees at least forty days before the collection should be performed every year, so that new blossom of leaves could come our timely.
- Plant protection measures should be provided in the forest area under the supervision of Scientists, e.g.. 'Poy' like disease in kendu leaves often found which affect the productivity and quality of leaves.
- During the process of drying and storage, the MFPs should be protected from insects and pests attack, i.e., white ants. For this purpose, drying should be done on rocky tracts and proper insecticides should be used.
- A Total Literacy Campaign should be launched as a movement in tribal villages and they should be made acquainted with the standard weight and measurement and currency system.

- Government should negotiate with the extremists and control ‘Law and order ‘ problems so that full exploitation of minor forest produce be made and margin of sale and purchase prices be distributed among the tribals.
- Government should make efforts to stop illegal felling of tree so that the tribal households dependence/sustenance on Minor forest produce could be maintained.

## **Flora:**

### **Importance of Conservation**

Extinction has been the destiny of a great number of plant species including several unique and irreplaceable varieties. Some of these have disappeared from the earth in nature’s own process of evolutionary changes, but for many others extinction has been caused by intense human activities. Entire Rajmahal hills appear to be highly disturbed. Shifting cultivation, mining operation and need for timber and firewood have caused rapid denudation of the forests in the last few decades. There is thus urgent need to document the biodiversity of the region to save plant taxa from becoming rare, threatened and endangered. Many plant species may vanish forever if conservation measures are not taken immediately.

With the cutting of tree cover, the climate for the growth of ground herbaceous and shrubby elements and epiphytic flora, ferns and fern allies etc., become really inhospitable. All these categories of plants naturally become exposed to threatened environments. Obviously, urgent steps need to be taken for the conservation and restoration of these over exploited forests of northeastern Jharkhand.

### **Recommendations/suggestions to conserve biodiversity**

1. In order to reclaim abandoned mines, the taxa which have been recommended for large scale plantation include *Acacia auriculiformis*, *A. catechu*, *A. nilotica* spp. *Indica*, *Alstonia scholaris*, *Albizia lebbek*, *Anogeissus latifolia*, *Azadirachta indica*, *Artocarpus heterophyllus*, *A. lakoocha*, *Buchanania lanzan*, *Cleisanthus collinus*, *Casearia elliptica*, *Croton roxburghii*, *Cassia fistula*, *C. siamea*, *Diospyros melanoxylon*, *Dalbergia sissoo*, *Dalbergia lanceolaria*, *Ficus hispida*, *F. racemosa*, *F. religiosa*, *F. benghalensis*, *F. virens*, *Falcourtia jangomas*, *F. indica*, *Moringa oleifera*, *Terminalia bellirica*, *T. alata*, *T. arjuna* and *Zizyphus mauritiana*.
2. Motijharna area (near Maharajpur) should be fenced and mining activities should be immediately stopped.
3. Some important fossiliferous localities such as Sonajari, Mirzachowki, Daukuti, Aamrjola should be protected and declared as Jurassic fossil park.
4. *In situ* conservation of rare and threatened plants should be done by making such area as protected zone.
5. A germplasm bank for maintaining wild relatives of cultivated and other useful and botanically interesting plants should be established.

6. Botanical Garden at the district headquarters should be established with special reference to collection, cultivation and maintenance of local plants. The emphasis should be given to promote ecotourism by developing botanical gardens.
7. A list of rare plants with their illustrations should be prepared and published to ensure public awareness about local flora.
8. A cell for monitoring the floristic changes should be established.

The **wastelands** rapidly increasing in the state should be given immediate attention to restore the forest cover and for maintaining the ecology in the state.

There is need to establish an environmental information system, especially in the villages. The information agency can help the user in many ways. For illiterate and unskilled users the agency can have regional centers at a walkable distance, where villagers can meet directly and obtain information. The center can publicize information through radio, TV and magazines in regional languages and dialects.

**There is an urgent need to develop a corps of volunteers, resource persons and specific communities with proper training to study and conserve biodiversity.**

#### **Dolphin sanctuary:**

There is a need to declare some more areas like some places in the district of Sahabganj, which borders the state of West Bengal to protect the endangered River Dolphin species.

#### **Management of Industries:**

#### **Recommendations for Thermal power Plants:**

##### **Short term (5-7 years)**

1. The monitoring of wet and dry acidic deposition and its impact on soils;
2. The monitoring of aquatic and vegetation environment;
3. The concept of green lung should be popularized;
4. Bio indicators for air pollutants;
5. Training bystander population;

##### **Medium term (15years)**

1. Energy and environment policy
2. Carbon and sulphur tax
3. Emission standard
4. Clean fuels
5. Emission control
6. Combined cycle plants
7. Demand side management
8. Pollution prevention boards
9. Reducing losses
10. Renewables

##### **Long term:**

**Transition from carbon-based energy to a hydrogen based energy system.**

## **Agriculture:**

Crop rotation should be promoted for better agriculture and for this an awareness and training programme is required.

Many bacterial and fungal diseases in the silk worms seriously affect sericulture. Advancement in technology and improvement in marketing facilities would brighten the prospect of Sericulture in the state.

Distribution of seed mini kits, Field level demonstration, and Training programmes should be promoted among the farmers to increase the production of pulses.

1. Watershed management should be increased for water harvesting in the state.
2. Crop rotation by short duration crops till the moisture is present in the soil should be promoted.
3. Alternative land use plan and awareness for soil conservation should be given priority.
4. Soil characteristic changes with every 10 meters of altitude in the area and so proper crop planning are required.

## **Some other suggestions for agriculture:**

1. Fund should be provided for agricultural research and extension
2. All vacant posts of Agriculture Colleges and Universities should be filled.
3. Improved seeds should be produced in the state itself.
4. There should be secured and sufficient irrigation facilities with proper electric power supply for irrigation.
5. Farmers should be encouraged for **Fish farming**, Bee keeping, Goat farming, dairy and Poultry etc. Bee keeping is more in practice in the district of Muzaffarpur where Litchi production is a speciality.
6. Medicinal plants and flower cultivation should be promoted.
7. Kisan Mela and Kisan training should be organized at large scale in all three seasons (rabi, Kharif & Summer) at block levels.
8. Plantation should be increased to hold water for soil.
9. Tal areas should be given proper attention for better agriculture. Water pools may be formed for recharging so that the surrounding areas can get irrigation facilities.
10. Embankments and Bunds should be made in the undulating areas to stop water running away.

12. Looking on to the high runoff of rainwater and soil moisture retaining capacity for shorter period, raising the nursery early within June itself may result in less dependency on the rain in September.
13. Tubewells should be installed on war footing to improve agriculture. There is a need for scientific conservation of canal water. Traditional water harvesting systems like ponds and tanks should be rejuvenated. Water harvesting system should be developed properly for the storage of rainwater and increasing ground water recharge.
14. Short and medium duration rice varieties should be promoted.
15. Crop management practices should be improved to meet the challenge of draught. Short duration, dwarf and draught tolerant varieties of rice should be promoted. Raising the height of Bunds around rice cultivation area by 30% can increase 99% conservation of rainwater.
16. Weed control measures should be taken in the agricultural fields. This may be done by the use of insecticides at proper time. Other solutions to control weeds should be sought.
17. There should be a balanced use of fertilizers. Use of phosphate, nitrogen and potash is required for the maturity, growth and draught tolerance of the plants other than urea. There should be no shortage of these fertilizers at the time of need. During the period of water stress less nitrogenous fertilizers should be used.
18. Search for appropriate varieties is required.
19. Farmers should transplant whatever variety is available to them immediately.
20. Some of the fields should be brought under rice cultivation by sowing seeds directly instead of waiting for seedlings to come.
21. Motivation, awareness, scientific motivation towards modern technology for better Rabi crops rather than largely depending upon Kharif.
22. Arrangements for procurement and distribution of seeds of appropriate varieties of Rabi crop.
23. Adequate availability of fertilizers and insecticides should be there in time.
24. Training for developing knowledge and skill for the pattern of farming is required.
25. Nutrients and pest management training is required for sustainability and eco friendly conditions.
26. The water shed management is very much required in this area.

### **Dairy:**

Services should be provided in a satisfactory manner, like feeding, timely medical treatment, vaccination and non-supply of green fodder, etc.

The road network should be developed at village levels to establish a direct link between the producers and ultimate consumers.

The productivity among the lactating animals was found higher among the crossbreed cow than the indigenous cows. So, the breed of cattle should be improved.

The milk producers should be educated for the technical care and nutrition of their cattle.

### **Tea Plantation:**

In Ranchi, Simdega and Gumla tea cultivation was in practice but it have declined considerably so there is need to reorganize the effort in suitable climatic zones.

### **Pest Management:**

It is suggested that proper steps be taken for producing bio-control agents by setting up such laboratories in the state itself.

It is suggested that the government should take proper steps to create awareness regarding the ill effects of pesticides and propagate the adoption of alternative method of pest control.

### **Water Storage:**

There is need to raise the water storage capacities of the ponds. This could be achieved through incorporation of pond excavation work under the rural employment scheme. This will help strengthen both irrigation as well as aquacultural potential of these water bodies.

### **Key References:**

**Status of Elephant in Jharkhand** by H. S. Gupta, IFS, Divisional Forest Officer, Saranda Forest Division, Chaibasa.

**Present Status of Biodiversity in Jharkhand Its Threats and Conservation, Issues** By D. S. Srivastava, Univ. Prof. And Secretary Nature Conservation Society, Daltonganj (Jharkhand).

**BIODIVERSITY IN JHARKHAND: PRESENT STATUS AND STRATEGY FOR CONSERVATION;** Arun K.Pandey, University Department of Botany, T.M. Bhagalpur University, Bhagalpur 812007, Bihar.

**Avian diversity of Jharkhand;** Arvind Mishra, State Coordinator, Bihar & Jharkhand, IBCN (a network of BNHS)

**BIODIVERSITY OF GANGA BASIN OF BIHAR & JHARKHAND**, Dr. T.K.Ghosh, University Department of Zoology, T. M. Bhagalpur University, Bhagalpur 812007, Bihar.

**Agriculture in Bihar & Jharkhand**, By Prof. R.N.Singh, Retd. Prof. Agriculture College, Sabour,

**Geography of Jharkhand**, Prof. Anil Kumar, ex. Head, University Deptt. of Geography, T.M.Bhagalpur University, Bhagalpur,

**Status of Aquatic Animal Biodiversity of Eastern Bihar.** S.P.Roy, University Department of Zoology, T.M.Bhagalpur University, Bhagalpur-812007

**Aquatic insects of eastern Bihar**, S. P. Roy, H. S. Pathak & V. Kumar  
Post Gradu. Dept. of Zoology, T. M. Bhag. Univ.

**AQUATIC MOLLUSCS OF BHAGALPUR**, U.P.Sharma, S.P.Roy, and D.N.Rai  
Post Graduate Department of Zoology, Bhagalpur University, Bhagalpur – 812007.

**Contribution of DR. VIDYA NATH JHA**, C.M.Science College, Darbhanga, Bihar

- 1. BOTANICAL ROSERIES AND NON-FLOWER GARLEND IN ETHNIC LIFE OF MITHILA REGION (NORTH BIHAR)**
- 2. CERTAIN SCIENTIFIC OBSERVATIONS AS DEPICTED IN INDIAN PHILOSOPHICAL PRINCIPLES**
- 3. Indigenous colours used in the paintings of North Bihar (especially in Mithila Region)**

**SERICULTURE** by Dr. Pitambar Pathak, Marwari College, Bhagalpur-812002

**BIOLOGICAL MONITORING OF RIVER SUBERNRAKHA** By Dr. G.R.Datta, University Department of Zoology, T. M. Bhagalpur University, Bhagalpur 812007, Bihar.

**IMPACT OF CHRISTIANITY ON THE TRIBES OF JHARKHAND** by R.Upadhyay.

**Floods & Drought : Jharkhand Faces the Forces of Nature** by Nityanand Shukla.

**Establishing a corridor for the elephants of Jharkhand using Remote Sensing and GIS** by :Richa N.K. Sharma, Lecturer, Department of Remote Sensing, Birla Institute of Technology, Mesra, Ranchi 835215, Dr Ashok Kumar

**Sinha**, Ex. Professor and Head, Department of Zoology, Ranchi University, Ranchi 834 001  
**Dr M.S. Nathawat**, Professor and Head, Department of Remote Sensing, Birla Institute of Technology, Mesra, Ranchi 835 215,  
**Ashok Kumar Pandey**, IFS, Director, Bhagwan Birsa Zoological Park, Ranchi, 835 215.

**Personal Interviews with:**

- 1. Sri Vikas Chandra, DFO, Wildlife, Hazaribagh**
- 2. Mr. A. K. Singh, Range Officer, Wildlife, Giridih.**
- 3. Many others at grass root levels**